A McGraw-Hill Publication
San Francisco, Calif.

December 15, 1926
25 Cents

Journal of Electricity

Devoted to the Economic Production and Commercial Application of Electricity
IN THE ELEVEN WESTERN STATES

Manufactured by
Meadows
Manufacturing Co.,
Bloomington, Illinois

Fundamentally right-the Washer and the Sales Plan!

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Devoted to the Economic Production and Commercial Application of Electricity

IN THE ELEVEN WESTERN STATES

A McGraw-Hill Publication

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Interpreting Reader Interest

INTERPRETING the characteristics of the readers of its publications to industry and finance is one of the tasks to which the McGraw-Hill Publishing Company is devoting considerable time, effort and money. For two years full-page advertisements have been carried each month in the leading newspapers in the financial and industrial centers of the country. These advertisements have been institutional in that they have brought forth a concrete conception of the organization that is behind the editorial and advertising reader interest of the subscribers to this and other McGraw-Hill papers.

Briefly, this organization consists of 108 staff editors, drawn from industry and trade to study and interpret the industry their papers serve. They are located in nine strategic centers and travel more than 700,000 miles per year. In addition 3,000 or more industrial specialists regularly contribute to the columns of the McGraw-Hill papers on problems and developments of their special fields. A staff of 467 special news correspondents rounds out this editorial picture.

Advertising reader interest is backed up by 105 advertising salesmen whose first function is to advise on marketing problems and interpret buying habits and buying problems. Behind these are 56 seasoned advertising planners, writers and artists trained in the appeals and mechanics of industrial advertising.

Just how and why this organization functions has been the subject of the series of advertisements mentioned above. On pages 8 and 9 of this issue is another one of this interesting series.

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Pawtucket, R.I. 1926

Pacific Coast Representatives: ALLIED INDUSTRIES, INC., 455 Second St., San Francisco 305 Ninth St., Oakland 1256 Factory Pl., Los Angeles 53 Fourth St., Portland 532 First Ave., South, Seattle

EDITORIAL

Speaking About Electrical West

THIS is the last issue of the Journal of Electricity as such, and on Jan. 1 next, Electrical West makes its first appearance. Judging by the many letters that have come to this office since the preliminary announcement of the change was made, the choice of the name has met with instant acceptance.

A change of name for a publication such as this, and especially in view of the fact that the Journal of Electrity has a background of service to the electrical industry of more than thirty years, should be preceded by prayer and fasting. One may do no more than theorize as to the efficacy of such a change, and, in the final analysis, the case rests with a jury of 6,000 readers. The best logicians in the world frequently find themselves entirely wrong, because, perhaps, they know more about logic than humanity.

This makes the many commendatory letters concerning Electrical West all the more gratifying, and incidentally relieves the anxiety of the publishers, who feel inspired to greater and greater efforts to make good the promise conveyed of a bigger and better journalistic service through Electrical West than was possible with its predecessor, the Journal of Electricity.

As an earnest of its sincerity, the McGraw-Hill Publishing Company has authorized the purchase and installation of additional mechanical equipment, by which twice the flexibility in the selection of the typographical make-up of Electrical West will be available, so that the reading of its pages will be made easier, with less eyestrain and need for concentration.

The world moves fast. Those who do not keep up with the procession will be left behind, and it is the desire of the publishers that Electrical West shall always be abreast of the times and worthy of the progress of the industry in the district it serves.

Will Congress Pass the Boulder Canyon Bill?

IRRESPECTIVE of the action the sixty-ninth Congress takes upon income taxes, immigration, radio control or any of the other highly controvercial questions facing it, the Western states, and particularly those seven comprising the Colorado River Basin, will be interested chiefly in the fate of the Swing-Johnson Bill. In its amended form this measure provides for the appropriation of approximately $125,000,000 for the construction of a high dam at Boulder Canyon for the purpose of providing flood control, irrigation and power development. It is understood to have the backing of the administration but it is bitterly opposed by Arizona and certain of the upper basin states.

Like practically every other phase of the Colorado River question, the Swing-Johnson Bill is the focus of a mass of political bickering, sectional jealousy and emotionalism. On another page of this issue an Arizona engineer sets down some of the objections of Arizona to the measure. To be beneficial to that state any dam on the Colorado River must back water up to el. 1,800. Because it does not do this the Boulder dam is construed to be chiefly for the benefit of California. Certainly this is a logical objection.

Moreover, a Boulder Canyon dam hardly will meet the needs of the Imperial Valley irrigationalists whose chief interest in the bill is flood control. From five to six years would be required before such a dam would give any measure of protection to this district. A report is now current that a flood of 72,000 sec.-ft. would prove disastrous. Certain interests in the Imperial section now have withdrawn their support from the Swing-Johnson Bill in favor of an emergency appropriation to provide flood protection. Seemingly this will be required, irrespective of whether the Boulder dam is constructed or not.

In the face of the mass of conflicting interests, it is to be hoped that Congress delays action on this measure. The brief evidence submitted here is sufficient to prove that a dam at Boulder Canyon is not the answer to the situation. Legislation that would pave the way to amicable agreement between the many parties whose interests conflict is much more desirable.

Industry Must Build Load Faster Than Normal Growth

FOR lack of a better yardstick it is customary to use the average annual kilowatt-hour sales per residential consumer as a measure of the effectiveness of load-building among this class of customers. On another page of this issue the general sales manager of one of the Northwest utilities cites figures for several central stations in that territory that show results almost double the national average of 365 kw-hr. per year. His own company showed a growth in average residential consumption from 245 kw-hr. in 1918 to 630 kw-hr. in 1926 or an increase of two and one-half times. A second company has an average of 656 kw-hr. per residential consumer per year exclusive of flat rate water-heating.

While these records of themselves are imposing, what the industry is interested in learning is how they were achieved. To use the words of the writer of the article they are the result of a more or less sustained effort to build load faster than normal growth and are not due to natural growth of the use of electricity in the home. Rates are not abnomally low; electric ranges and water heaters are not of themselves entirely responsible. Better standards of illumination consistently sold, and the continuous effort put behind the sale of all classes of current-consuming devices, including ranges and water heaters, are directly responsible. Nor was it done by the delegation of the job to someone else. The companies in question accepted the responsibility of building load faster than normal growth and went into the field with specially trained and schooled selling organizations. Co-operation from other branches of the industry was desired and was accepted. Moreover, the feeling is unanimous that all branches have shared together in the benefits.

If one were to ask if these companies were satisfied with present results, the answer would be an emphatic no. The present goal is 1,000 kw-hr. per domestic consumer per annum, and this goal is to be achieved by redoubled efforts to build load faster than normal growth. Companies whose records show an annual residential consumption approximating the national average will find that they have a fine mark to shoot at when they see the need for commercial policies that will assure the building of load and load factor at a rate greater than normal and at the same time in keeping with the growth of the investment in utilities and the conveniences of their customers.

Federal Power Commission's Annual Appeal Still Is Unanswered

IN one breath the sixth annual report of the Federal Power Commission, just issued, announces that during the last fiscal year construction was started on twenty new projects which will have, when completed, an installation of 1,220,000 hp. or 40 per cent of the total placed under construction during the preceding five years. And to counteract that remarkable record in the next breath the report declares that the work of the commission, considered from the standpoint of applications pending upon which it has been unable to take action, is not satisfactory.

To prove this point the report presents a mass of evidence which, briefly summarized, resolves itself into the following: When the commission was organized in 1920 the departments of War, Interior and Agriculture made temporary assignments of personnel in the expectation that Congress immediately would pass such legislation as would permit the commission to employ its own personnel. Despite the enormous increase in the volume of work the commission has today only two more people on its staff than the force temporarily supplied in 1920. Its appropriations have been reduced from $100,000 in 1921 to $33,400 for the current fiscal year. The aggregate expenditure since organization has been approximately $145,500 per year, largely met from the appropriations of those departments whose personnel is engaged temporarily in commission work. On the other hand the commission has collected from licensees annual charges aggregating $1,127,000 for seven years, including an estimate for the fiscal year 1927, or more than enough to meet all expenditures since the passage of the act.

This story is not new. In all of its annual reports the commission has appealed for legislation that would give it sufficient finances to employ its own personnel and at the same time permit more adequate administration of the Federal Water Power Act. The evidence presented in the report indicates that even at present the work of the commission is self-supporting and that if greater leeway were afforded additional money would be collected from the use of government lands and other properties.

From the standpoint of the government, of the commission, of the electrical industry and of the public the situation is one that warrants attention and correction. For the government it will mean increased revenues and a better administration of the law. For the commission it will mean freedom from dependence upon other government departments and the ability to keep up with the amount of business presented to it. From the standpoint of the electrical industry there will be less delay in the action upon permits and licenses. For the public it will mean a continuance of a policy that has safeguarded large investments and eliminated speculation from the development of the country's hydroelectric resources.

The Apartment House a Hotbed for Prospects

A COMPARATIVELY small item elsewhere in this issue records the results achieved in one phase of the commercial activities of the two central-station companies serving Portland—that of electrifying new apartment houses. To have equipped 89 per cent of the 1,362 apartments put in service in the first nine months of this year with electric ranges, and 63 per cent with electric refrigerators would seem to indicate a fairly satisfactory result of consistent sales effort, because, of course, 1,210 ranges and 856 refrigerators were not sold without effort. The significant fact about the range installations is that they were sold in competition with a gas company which is noted for many things, but not for complacent passivity when it comes to letting business get away from it. This fact points to the conclusion that the pioneering of electric ranges in that city has borne fruit, and that now when a landlord thinks of modern equipment he thinks of electricity instead of gas—a situation highly desirable to the electrical industry in any community.

Even though it may be assumed that the landlord's acquaintance with the electric range was an influence in his purchase of the refrigerators, nevertheless it will be agreed that to secure a saturation of 63 per cent in refrigeration was the greater accomplishment of the two. Here is an appliance that has not been pioneered to any extent in the Northwest and has gained little prestige in com-

parison to the electric range, and yet more than 70 per cent of the range purchasers elected also to equip with electric refrigeration. Truly in this field lay the real sales achievement, and doubtless beneficial results beyond those immediately apparent will be forthcoming.

Sales executives repeatedly have pointed out that sales of ranges to apartment houses have been a great stimulus to individual domestic sales. Many of the apartment dwellers of today are the home-owners of tomorrow, and, having been educated to the joys of electric cooking in their apartments, and thus having had some of the sales resistance overcome, they have been eager buyers of electric ranges for their new homes. These same executives that have noted the favorable influence of the use of electric ranges in apartments on the sale of ranges to home-owners expect a similar influence to be felt in the case of electric refrigeration and look forward to satisfactory results in this field from the fact that so many Portland apartment dwellers now are being educated to what electric refrigeration will do for them.

Other power companies may take a tip from this line of reasoning and recognize in each apartment equipped with ranges or refrigerators or both a potential hotbed of future prospects who, when they get ready to buy or build, already will possess the desire to own the kind of appliances furnished for their use in their apartments. Thus each apartment equipped is a two-fold benefit to the company and might well merit extra effort on the part of the commercial department to land such business.

Coincidence or Is the West a Training Ground for Executives?

ANNOUNCEMENT elsewhere in this issue to the effect that James B. Black, vice-president and general manager of the Great Western Power Company of California, has been selected to fill the office of vice-president of the Western Power Corporation with headquarters in New York City serves to emphasize further an interesting state of affairs to which attention has been directed in these columns before.

Horace Greeley's advice to young men seems to have reversed itself, for now the East is reaching toward the land of the setting sun for personnel competent to direct the affairs of great national organizations within the electrical industry.

With 90 per cent of the population of the United States east of the continental divide, it would appear reasonable to suppose that such a preponderance of numbers automatically would set up a surging tide toward the Pacific Coast, rather than that the East, from the top of its great skyscrapers, should peer over the Rockies in search for the man to meet the need of the hour.

Perhaps both premises set forth in the foregoing are right. In the case of the Western Power Corporation, and only a few months ago in that of the General Electric Company with E. O. Shreve, who is now manager of its industrial department at Schenectady, it was the search for the man, wherever he might be, and in both cases he was found on the Pacific Coast. Is this a coincidence, and no more, or is there anything about the character of Western electrical development that produces the man when he is wanted?

Easterners smile with goodnatured tolerance whenever it is said that "the West is different," but, isn't it so after all? Where the population is sparce, a good job or a bad job sticks out like a sore thumb. Where there is so much to be done, and so comparatively little of each specialized part, versatility is at a premium, and that is what is needed in an executive. He must be familiar with many things, if he is to direct the labor of others. Perhaps the Pacific Coast is destined to be the training ground for executives, if, in truth, it has not already become so. At any rate, two great national electrical organizations this year alone have taken two of our very best, and our feeling of pride in the recognition that has been accorded to them is tempered with sadness at our great sense of personal loss.

Electric Truck Men Demonstrate That All Is Not Over in That Field

IF it is said of the electric truck situation that it is slumbering, there are signs at least of a stirring in that sleep. Moreover, such indications are much more encouraging than would be evidence of the death of so necessary a branch of the industry.

Electric transportation has suffered greatly at the hands of the gasoline engine. There is no doubt about it. So firmly fixed in the public mind are the merits of the gasoline machine that to focus attention upon the virtues of electric trucks is an almost superhuman task. The business has never been prosperous enough to justify the tremendous advertising campaign that it would require to put electric trucks on a plane of equality in public acceptance. The only alternatives are a quiet but persistent effort to keep electric trucks sold where they are already in use, to study their values and to spread the good word of their performance wherever possible.

And Now—Trained Safety Engineers

SATISFACTORY control of industrial and traffic accidents can be brought about only through the services of trained experts. It is trite, but true, to say that most accidents are easily preventable in the fullest sense of that word. Experiments made by various utilities in placing full-time safety supervisors even on construction jobs have proved beyond doubt the economic desirability of such efforts.

Believing in the efficacy of such a policy the University of New York City has innaugurated a course in safety engineering. It is recruiting students for this course from among industrial executives, insurance inspectors, engineers, transportation directors, and physicians employed by utilities or manufacturing companies, and expects to turn out men well trained along practical lines. Such a step is highly commendable and it is to be hoped that other universities will follow suit.

DISCUSSION

Regarding Arizona's Objections to the Boulder Canyon Dam

To the Editor:

Sir: There are certain basic facts upon which to formulate a plan for logical economic development of the Colorado River. The principal ones are the total quantity of water, the amount of land that can reasonably be expected to be irrigated in the entire territory involved, and the physical features of the river, with the deep canyon region separating the upper basin from the lower, each basin having different characteristics and requirements of water.

A business organization controlling the entire situation would not attempt to allocate in advance certain amounts of water to one portion and others to another. It would determine from year to year what projects appeared profitable to develop, and would proceed to develop them, regardless of what proportions were in the upper and lower basins. That is true economic development and the only kind that is best for the most rapid development of the natural resources of the United States.

The average annual reconstructed flow of the Colorado is agreed upon as approximately 20 million-acre ft. At the time the seven-state compact was drafted the needs of each state were tabulated and the water apportioned to the upper and lower basins, there being a surplus to cover the present use in Mexico and about a million and a half acre-ft. over the estimated requirement for each basin.

If these estimates were true and fair, no one in any of the states should object to the division of the water as provided in the Santa Fe Compact. The physical facts have not changed, but our knowledge of them has changed considerably. What is the present situation? Los Angeles has discovered that over a million acre-ft. may be diverted to the coast region for municipal water supply, and is proceeding with the preliminaries of construction.

It has also been found that 600,000 acres in the lower Gila Valley in Arizona can be irrigated by lifting the necessary water 200 ft. The cost of this project is reasonable enough for it to be considered practicable for development in the very near future. This would require about 2,400,000 acre-ft.

These two projects call for over 3,400,000 acre-ft. per annum, for which no account was made in drafting the Santa Fe Compact. With these two projects the entire surplus for the lower basin is used up and an actual deficiency exists.

These developments alone should be enough to prove the utter fallacy of attempting to apportion all or practically all of the water of the Colorado at the present time. I do not feel at liberty to give his name, but the head of one of the major branches of the Department of the Interior has said, and I think the advice is good, "For the present, plans should be made on a conservative basis. The stage of development indicated . . . . as of the near future seems to be safe. If the apportionment of water there indicated is not the best, rectify it, but let this remain as the tentative total until excellent basis for some other action is available."

Here I wish to make a constructive suggestion, applicable to the division of water of all other interstate streams as well as the Colorado. If the Santa Fe Compact were ratified and in effect, it would be necessary to have records of all water rights and water diversions in and from the basin in order to adjudicate claims.

This would be necessary because it would be impossible to tell without such records whether water shortages were due to small runoff of water or excessive use in certain parts.

I suggest that the Department of the Interior be authorized to establish the office of water commissioner, collecting records of water appropriations and use from interstate streams as is now done by water commissioners in each individual state.

These records should be assembled in groups covering the stream basins, one being for the Colorado River basin, and including all the appropriations from the basin in all the seven states. The records should be in full agreement with the records of the same appropriations by state commissioners; taken from state records in the case of past appropriations and made co-ordinately with state records in the case of future appropriations.

The federal water commissioner's jurisdiction need not and should not conflict with that of the individual states. In case of adjudication of claims all within one state, though on an interstate stream, if no other state were involved the state water commissioner would have jurisdiction. Wherever rights in two or more states were involved the federal commissioner would have jurisdiction.

As time goes on the larger and interstate streams come nearer to complete development, and conflicts between interstate claims become more and more frequent. Why not make this the time and the occasion for the establishment of an orderly way to handle the situation?

The Los Angeles water supply and the Parker-Gila Valley projects do not complete the list of possible developments discovered since the compact was formulated. The Arizona Engineering Commission made a preliminary estimate that the lower Gila Valley—600,000 acres—could be irrigated at a cost of $168 an acre. It also investigated a number of routes for an Arizona high line canal, and made preliminary estimates on one requiring 134 miles of tunnels, 236 miles of main canal and a large regulating reservoir, in addition to a diversion dam and main storage dam, the latter not included in the estimate of cost.

For a project to irrigate two million acres of land, the Arizona Engineering Commission estimated the total cost at practically 450 million dollars, or $225 per acre. No interest was included.

There are between three and four million acres of land in Arizona to which it is possible to apply water from the Colorado River. Broadly speaking it is physically possible to put a dam anywhere along the river and divert the water by gravity to any lower point. The cost of such a project and the question whether it is a porofitable undertaking are the things which determine whether it should be put through.

Among the many plans that are possible one proposed by the writer, which has thus far not been officially investigated, appears to be cheap enough to warrant starting construction in the immediate future. It consists of a dam about 700 ft. high in Marble Gorge, about 40 miles below Lees Ferry, for regulation and diversion of water and for power development, and a tunnel from the dam to a suitable point on the Verde River, fairly close to the center of Arizona. The dam would utilize the same excellent storage basin as the Glen Canyon or Lees Ferry dam.

The tunnel would be about 116 miles long, and the water from it, delivered at about 3,000 ft. above sea level, would flow down the Verde River to its mouth near Phoenix with nearly 2,000 ft. of fall, then some 250 miles along the Salt and Gila Rivers to Yuma and the Gulf of California. Large tracts of fine irrigable land are found on both sides of the latter rivers.

This tunnel, made large enough to irrigate two million acres of land, is estimated to cost about 210 million dollars, or less than half as much as the high line canal aforementioned. Land in Arizona will stand a development cost of a hnudred dollars an acre or somewhat more.

Some have questioned if there is enough water in the Colorado to irrigate these two million acres in Arizona. An odd thing about this is the apparent assumption that all feasible projects in other states have a preferred right, perhaps because they were known to be feasible or were listed first.

The record of river flow at Lees Ferry supports my belief that it will utimately be proven as a fact, that if only the actual needs of all the basin states are considered, there is water enough for all the land in the United States, but not enough for additional land in Mexico.

Reference to the Fall-Davis report and to testimony given in the Congressional Record of Jan. 31, 1923, will disclose that the estimate of water for the upper basin states included not only the projects now becoming feasible and expected to become feasible in both near and distant future, but also those so expensive that their development could not be foreseen at all, and 100 per cent of the unirrigated land within present projects and of possible extensions.

To illustrate, the Congressional Record above referred to, page 2814, shows that 317,000 acre-ft. was estimated for additional diversion to lands outside the Colorado River basin, and Mr. A. P. Davis says, "The only one that can be reasonably included as at all probable . . . would be

110,000 acre-ft. for the Denver City water supply. For purposes of computation, however, we have included the entire amount as listed above."

It is a fact that under the compact there is not enough water allotted the lower states to serve all the real needs of California and the recently discovered areas in Arizona. It is foolish to expect California to give up any of her really feasible projects so that land may be irrigated in Arizona when water that in all probability will never be used by the upper states has been "assigned in perpetuity" to them by the compact.

A California-Nevada-Arizona agreement therefore becomes impossible, and inability to ratify the seven-state compact follows. The recent election in Arizona has brought out the fact that sentiment in the state is practically unanimous against the location of the first big storage dam in Boulder or Black Canyon or below.

The reason is a perfectly simple one. Either of these sites is too low for Arizona to utilize any considerable amount of the stored water. To suit Arizona the storage dam must back water up to an elevation of 1,800 ft. or more.

The Swing-Johnson Bill proposes that the Government put up 125 million dollars for river development almost exclusively for the benefit of California. Locating the dam high enough on the river will remove one of Arizona's chief objections to the plan.

The other chief objection is the ability of the land owners in Mexico to appropriate the water stored by a Boulder dam, and the probability that they will do so. Thus far it seems no attempt has been made to safeguard the utilization of the water in the United States. Until this danger is guarded against it is almost certain that Arizona will continue to oppose the Swing-Johnson Bill.

A dam at Marble Gorge would satisfy the requirements of California, Nevada and Arizona. It would store the flood waters as effectively and protect the Imperial Valley and other low land just as successfully as a Boulder dam, and so also would provide additional water for irrigation. It would be just as well suited as Boulder for the Los Angeles water supply, which is to be taken from the river bed many miles below either dam site.

It would provide sufficient power for the needs of California, Nevada and Arizona for years to come, and lastly will store the water high enough that Arizona can use it by any plan that may be devised. Only one real objection can logically be raised against putting a dam in Marble Gorge, and that is not a major consideration. It is that the power would have to be transmitted farther to reach the California markets.

There is plenty of the power only waiting to be developed. No state needs to worry about an allotment of power. Nevada users would be able to tap a line from Marble Gorge to California about as conveniently as the power plant at Boulder. Arizona's present need of power is relatively greater than is realized, being probably about 100,000 hp.

The Swing-Johnson Bill is to become effective upon ratification of a six-state compact. Can six states divide up the resources of seven, without the consent of the seventh? If so, then two could divide up the resources of three and compacts would become very popular.

Congressman Hayden (now senator-elect) of Arizona told the Congress at its last session that if Arizona is ignored in the passage of the Swing-Johnson Bill she will take the matter to court—the very thing which compacts are supposed to prevent. It is with the greatest regret that I see the matter drifting as it is. I have been keenly interested in Colorado River development for years and have given it a great deal of study. The only way I can see in which the construction of a combined flood control and power dam such as Boulder can go forward unimpeded by interminable bickering and lawsuits is to provide definitely for the following two important features:

1—For the benefit of all the Colorado basin states, provide that Mexican land is to acquire no rights to water made available by this and future construction in the United States.

2—Locate the first storage dam where Arizona can benefit from it as well as California and Nevada. The best location for all concerned is the lowest feasible site above the Grand Canyon, probably forty miles below Lees Ferry.

These two things being provided for, the lower states need not settle the division of water. But suppose the upper states still demand a division of water satisfactory to them before any project is started? Another modification can be made that still permits the most essential work. That is to agree that no additional appropriations for consumptive use of water be made in any of the seven states from the Colorado River until an agreement for division is reached or a policy determined.

This would permit flood prevention and power development work to proceed at once. If the upper states object to building a storage dam strictly for flood prevention and power, with a definite agreement that no consumptive use of water will be made, then they are playing the dog-in-the-manger act, and every one should know it. If all Congressmen and Senators knew this beyond reasonable doubt they would no longer countenance the delay in removing a great flood menace and the beginning of a great constructive development.

The people of Arizona are in deadly earnest in opposing the Boulder Dam, and they are not playing dog-in-the-manger. The land is here, millions of acres, waiting for water. Water is in the river—enough for some two million acres in Arizona, and we know how to get the water onto the land at reasonable cost. Why should California and Nevada insist that the main storage dam be built so low that Arizona cannot use it?

C. C. TILLOTSON, Engineer.

Clarkdale, Ariz.,
Nov. 26, 1926.

Room for the Dealer in Refrigerator Business Too

To the Editor:

Sir: Permit me to congratulate you on the excellent resume of conditions in the electrical refrigerator business which appeared in the November first issue. It provides food for thought for anyone interested in the distribution or sale of this equipment. There is one angle of the situation, however, which it seems to me you have overlooked and that is the position of the electrical dealer who would like to carry this appliance and share in the profits to be derived from it. There is a real field for him, it seems to me, particularly in the rural districts where the manufacturer's representatives are not so active.

Of the many dealers who have attempted to stock refrigerators, however, only a few have succeeded and this principally, I believe, for the reason that the refrigerator is not primarily an electrical device. It requires an expert to handle it—and the dealers do not seem willing to take the time to become experts. An instance was reported not long ago of a dealer who was called to service a refrigerator he had sold. A little later he called up the wholesaler from whom it had been purchased originally and asked for help. "I have got the motor running all right," he said, "but the thing won't get cold. I heard a sort of little z-z-z-z-z while I was fixing it. Do you think that has anything to do with it?" He had allowed the entire refrigerant to escape and didn't know it.

The servicing problem is one which is not fully settled from any standpoint. In spite of statements to the effect that servicing on refrigerators costs less than that on any other major electrical appliance, this has not proved to be the case in practice. This means that the margin of profit allowed the dealer has to cover not only the usual items of overhead, but also the expense of keeping the machine in order. Either a wider spread should be allowed, or the servicing should be carried on with some assistance from the manufacturer—or, and this is probably the solution, the public should be educated to pay its own way as it goes.

The electrical industry has unfortunately started off on the wrong foot by giving the public to understand that free servicing on all electrical equipment for at least a year after it is purchased is their right and due. Why should they expect to have the electric range elements replaced, electric washing machines overhauled, electric refrigerators repaired without cost to themselves, when they receive no such additional bonus with their other purchases? When little Johnny pours a kettleful of boiling water over the grand piano, does the music company make good the loss? It does not, nor does the customer expect it. The electrical industry has made its own bed in this regard and it is perhaps its own fault if it finds it uncomfortable. But there seems to be no reason why it should leave things as they are. Why not remake the bed?

CHARLES GREY.

Oakland Calif.
Nov. 22, 1926.

A British Columbia Development

Upper Bonnington Falls, B. C., project of the West Kootenay Power & Light Company, some 14 miles downstream from Nelson, B. C. This plant contains two 6,725-kva. units and two 5,975-kva. units and was built during 1914-16 to supply power for the electrolytic reduction of zinc at the Trail, B. C., smelter. The river flow at this point varies from 5,850 sec.-ft. to 60,000 sec.-ft. Two other sites have been developed and are operated by the West Kootenay company, one a mile downstream at Lower Bonnington Falls, and one 12 miles from Grand Forks, B. C., at Cascade on the Kettle River.

The Increasing Responsibilities of the Industry's Commercial Departments

By A. C. McMicken*

General Sales Manager, Portland Electric Power Company, Portland

ENGINEERING and financial activities of electric utilities have had the center of the stage for some time past and have earned that position, but the opportunity for the commercial men of our industry to step into the lime light is here. Are we doing so? Are we ready to do so?

The commercial policies and activities of the electric utilities of this country vary greatly. Comparatively speaking, the electric utility commercial or sales organizations are of recent origin. In too many instances, electric utility executives and financiers have had too little sympathy with and understanding of salesmanship and commercial activities as applied to electric utilities. At least, commercial men have been prone to so place the blame. Commercial managers, however, have not always made the most of their opportunities and some of us still do not see the tremendous fields for new business open to us and have made no effort to sell our executives to these possibilities.

A. C. McMICKEN

believes that one of the responsibilities of the commercial departments is to build load and revenue faster than the normal growth of the industry. Intelligent programs which will sell more kilowatt-hours per kilowatt of installed capacity are the present need of the industry in his opinion.

We all are not yet awake to the fact that correct and efficient salesmanship requires specialized training and experience just as much as engineering and other technical pursuits. This factor has been largely overlooked in our business.

In many parts of the country, during the war and since, power companies have been so busy keeping up with the demands for electric service made upon them that intensive commercial activities have been deemed unnecessary or undesirable. On the Pacific Coast, due to generally lower rates, to our having sold the electric idea to the public many years ago, and for other reasons, we have no large groups of prospective customers residing in unwired homes or business buildings. We all have been busy spending large sums annually in building new and extending old lines and in increasing output, but have we been expending proportionate money and effort in increasing revenues from existing customers of all classes? If we are to take our proper position in the industry, we must build load and revenue faster than the normal growth. Much of the financing of the larger electric utilities was done before the world war when money was comparatively cheap. Many of our rates reflect this fact. Our growth since the war has been phenomenal and the demand for money for extensions, betterments and increasing plant capacity tremendous, all requiring new capital at comparatively high interest rates. This has brought about conditions which make imperative the building of profitable load much more rapidly than at the normal rate of load growth.

It is imperative that we commercial men have a full understanding of the situation and plan carefully and intelligently a program which will sell "more kilowatt-hours per kilowatt of capacity installed." Mr. E. W. Lloyd in a recent address points out that, generally speaking, the very large systems in the country have not improved load factor materially in the last ten years.

The system load factor improves only as the load factors of different classes of customers improve and as new long hour uses for electric service are developed. I quite agree with Mr. Lloyd that most of the credit for selling the idea of electric service and the use of all manner of consuming devices goes to the manufacturers. We have lagged behind and in many instances have been prodded into activity by the manufacturers. Now that we have accepted most of the load building current consuming appliances and devices on the market as desirable both to the customer and to ourselves, what are we doing to put them into service?

* Excerpts from an address before the Commercial Section, Pacific Coast Electrical Association, Santa Cruz, Calif., Nov. 12, 1926.

I think I can state fairly that in the main we have only scratched the surface. Such load building campaigns as kitchen lighting unit campaigns, store lighting unit campaigns, electric refrigeration campaigns, range campaigns and many others, have been conducted spasmodically and with varying intensity and enthusiasm. In general they have been successful and ultimately profitable, but as an industry we yet have no commercial programs or policies sufficiently projected into the future to assure the building of load and load factor at a rate in keeping with the growth of our investment or the convenience of our customers.

Many Fields for New Business

Practically all of the load building possibilities obtain here that obtain in any other part of the country. While most of the Pacific Coast cities are not essentially manufacturing cities our electric service recognizes no competitor and our service operates most of the industries. In the main, this load is mostly induction motor load of poor load factor and worse power factor. Have we studied and exhausted all of the possibilities for the use of electric energy by our existing industries? I am sure we have not and that the possibility of adding much non-inductive apparatus is open to us.

I am impressed with the fact that aside from the principal business thoroughfares most of our city streets are inadequately lighted and our highways are not lighted at all. In the motorized age in which we live better lighted streets and highways are imperative; yet but little effort has been made to sell the public and public officials the value and necessity of more and better street lighting. Revenues from street lighting run from seventy cents per capita to approximately three dollars per capita per annum, with most of us in the seventy or eight-cent class. For some unknown reason, promoting street and highway lighting is generally considered undignified, unethical or dangerous, or all three.

Residential load factors are generally poor, although they average higher on the Pacific Coast than anywhere else, and residential business is recognized here at least as desirable and profitable business. As our residential customers far outnumber all other classes combined, they offer the greatest field for increasing revenue and load factor.

That the national average of one kilowatt-hour per day, or 365 kw-hr. per year per residential customer, can be profitably built to much higher levels is proven by the records of the utility I represent and by other utilities in the Northwest with which I am familiar. For the year 1918 the average consumption of all our residential customers was 245 kw-hr. per annum. For the year 1925, that average had increased to 558 kw-hr. per annum, and will probably run approximately 630 kw-hr. for the year 1926. This means that the average residential customer in 1926 will use two and one-half times the number of kilowatt-hours used in 1918, and this change has taken place without any change in rates and is due in part to better standards of illumination and in part to the use of current consuming devices, electric ranges and water heaters. Other companies in the Northwest can present similar figures.

This increase is not due to the natural growth of the use of electricity in the home, but to the more or less sustained effort to build load faster than the normal growth and illustrates in a small way what can be accomplished. No doubt similar records have been made in California and as yet the surface is only scratched, for none of us is yet satisfied with the use of electricity in the home.

Commercial cooking and heating generally has not had the support which this valuable non-inductive load deserves at our hands. Hotels, clubs, restaurants, hospitals and many other institutions can make profitable use of heavy duty cooking and heating devices.

Electric refrigeration now holds the center of the stage and demands our support whether or not its mushroom growth guarantees the best product and the greatest freedom from trouble. Free from troubles and service calls, electric refrigeration offers another splendid residential and commercial load builder.

Commercial Men Must Take the Lead

It is not my purpose to endeavor to point out all of the possibilities for load building in either the municipal, industrial, commercial or residential fields, but rather to reiterate the call which has been sounded by the National Commercial Section chairmen during the past few years for the commercial men of our industry to take their place in the sun and bring the commercial activities of electric utilities up to the high standard set by our engineers and financial heads. I am one of those who believe that if load is to be built more rapidly than the normal growth, the job cannot be delegated to others, but must be done by us. I fully appreciate the desirability if not the necessity of having the fullest co-operation of every branch of the electrical industry, but I maintain that the lead must be taken by our own commercial organizations. We, with specially trained and schooled selling organizations, must go directly into the field. The job facing us is vital—it is tremendous, and it cannot be dodged nor delegated. One of the utility companies in the Northwest took up the sale of electric ranges but a few years ago, largely because it could get no one to do the job for it. Today this utility has in excess of 16,000 electric ranges on its lines and during the first 10 months of this year sold in excess of 5,600 ranges. I cite this as an example of one type of central station load building, which cannot be delegated. Other Northwest utilities have been proportionately successful in building range load and without exception the ultilities of the Northwest are taking the lead in promoting and selling many different load builders, not only to residential consumers, but to industrial and commercial consumers as well. This, they have been able to do generally in co-operation with other branches of the industry, when this co-operation can be had.

Our duties as commercial men are steadily broad-

ening and should embrace much more than the management of "new business departments" organized primarily to contract new light and power business. Specially trained men are required to promote the use of and sell heavy duty cooking appliances, refrigeration, street lighting, industrial heating appliances, better store and residence lighting, electric ranges and water heaters, and this work should not be a side line of the regular light and power sales force.

Merchandising, in my opinion, is a distinct part of electric utility commercial activity. Our merchandise departments as a whole are operated at a loss, but they nuevertheless do build load and can be made to build good will. Our aim should always be to merchandise at a profit and to co-operate with electrical and non-electrical merchants and help create a demand for electrical merchandise.

Two of the principal reasons why we fail as merchandisers are that we do not select men trained along merchandising lines to manage such departments and give them the backing necessary to success, and because we merchandise half-heartedly, fearing the criticism of the electrical and non-electrical merchants who wail that we, by merchandising, are robbing them of a living. Experience has clearly demonstrated that an active utility merchandising department actually creates more business for other merchants and a greater demand for all manner of devices and appliances.

Power Companies Co-operate with Dealers

The power companies of the Northwest have been extremely liberal in co-operating with the dealers and that both have been successful in selling more appliances is borne out by statements from practically every commercial department executive in this territory. One executive says in this regard:

"It has been our custom to conduct one range campaign a year, usually during the two months of May and June. Everything possible is done to co-operate with the local dealers selling ranges. For example, we handle only one line of ranges. There are other good lines and where it is possible to select a dealer satisfactory to the range manufacturer and to ourselves we have offered to finance that dealer in the sale of electric ranges of a good make. Our financing consists in furnishing him with stock and carrying his paper.

"Further we do not install. All range installations are done by the dealer, whether the range itself is sold by him or by us. When it is sold by us the dealer is paid cash for his installation work and the amount is charged to the customer with his range and is usually paid to us on an installment basis. In one small district the business turned to the dealer in installing ranges sold by the power company amounted to $6,000 last year. This happened in one of our towns of less than four thousand population; it meant considerable to the dealer.

"I believe it is an actual fact that more electrical merchandise is purchased in territory where central stations are aggressively merchandising than in territories where they are not. We have found dealers profiting greatly by our exploitation of the appliance field, and doing more business after we became aggressive in merchandising than they did before. In other words, we feel that aggressive central station merchandising creates business and an active dealer can profit greatly when his central station merchandises. The non-aggressive dealers do not profit; that is natural. The opportunity to profit, however, is there. It is common for dealers in our territory to sell more of the devices on which we are campaigning at the time than at any other time during the year.

"We sell all merchandise at list prices where the manufacturer has established a list price. On certain lines of merchandise that do not carry a definite list price we offer specials to our customers at reduced prices. When these offerings are made the dealers are urged to participate with us, in which case we furnish the dealer the goods at our cost and charge a carrying charge for handling the account.

"The history of the commercial lighting campaign is similar. Our activity in developing commercial lighting business has resulted in the creation of a demand for better lighting. We do not continue the sale of commercial lighting units after our campaign period. From that time on all such business is turned over to the dealers. Our function in the lighting field is developing the demand. After this has been done in a satisfactory way we leave it more or less to the dealer to capitalize on.

"I believe similar history could be told of almost any electrical device which is now popular. It requires a development period. The central station surely is well equipped to develop the market on new devices and will profit more than anyone else when it is developed. Nothing could be more valuable to a contractor-dealer than this developmental work. In my opinion contractor-dealers should benefit greatly when the central stations in their territory merchandise aggressively."

The general sales manager of another power company, commenting on the sale of electric appliances by his company, says:

"My own feeling is that if appliance sales are left entirely to the dealers they will supply such devices only upon demand. Our experience has been that they do not put in the effort to sell appliances that we think they should. We have had this experience in several districts where we did no merchandising whatever, and we have felt that in order to develop the business, it was necessary for us to go into it. The results have been that our activity has created such a large demand for appliances that the dealers are doing more business than they did before we went into it."

The merchandising policy of still another of the power companies is reflected in a statement by the sales manager, in which he says:

"There is no doubt in my mind that central stations should merchandise all sorts of current concuming devices. They should use as their pattern successful merchants in other lines. Occasional sales at reduced prices or with special features are just as necessary in our business as in the department store.

"Nearly every month we endeavor to feature

some current consuming device which we are able to buy in quantities and sell to our customers at a reduced price. For example, if a manufacturer changes the design of a heater or is overstocked, we buy all he is willing to sell and circularize our customers with return post cards which act as an order on us to have delivered whatever article we are featuring. This method has resulted in selling thousands of air heaters, waffle irons, toasters, etc., and helps to bring our average kilowatt-hour consumption per residence to 656 per year exclusive of flat rate water heating.

"In the main, all appliances are sold at list and only on range sales, special purchases, or close out, do we deviate from this policy.

"I believe that the power companies should blaze the way in merchandising ethically and invite the dealers to carry on and join with their plans, but do not let them dictate what the policy should be."

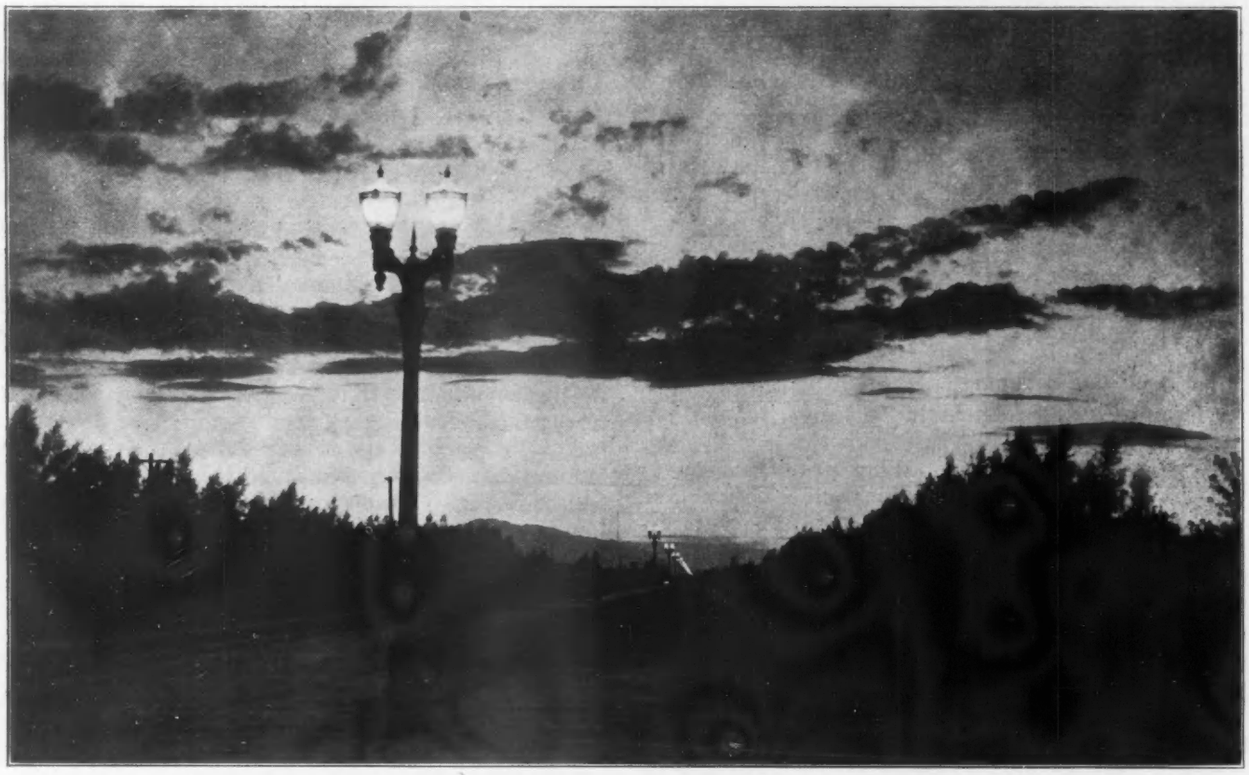
The selling efforts of another western utility result in increased sales by dealers in electrical appliances through the territory it serves. "During the campaign periods," says this company, "other electrical and non-electrical merchants profit by our activity and advertising. They have stated in a number of cases, particularly during washing machine campaigns, that they have had a noticeable increase in business, although they were not actively campaigning and advertising themselves. Clean competition is a help to any merchant and I believe central station merchandising is a help to other merchants of electrical appliances."

Probably the most important factor in increasing the number of kilowatt-hours per kilowatt installed is the rate structure. It seems to me that rates have been left too much to theory and to rate engineers and that we commercial men have had too little to say in rate making. Witness the wide variety of rates in use throughout the country. It is quite possible to frame rates at least fairly understandable by the public, which will bring in the necessary revenues and at the same time encourage our customers to use more kilowatt-hours. Before any elaborate load building programs are undertaken, our rate structures should be studied and we should be sure that they are designed to encourage the use of electricity and not discourage it.

I should like to call your attention to and commend the efforts of the National Commercial Section in bringing about the co-operation of manufacturers and power companies in national appliance selling campaigns. I feel it the duty of the geopraphical divisions to take an active part in the work of the National Commercial Section and its committees.

Our responsibilities as commercial men to our companies, to the industry and to the public are grave responsibilities and our opportunities are unlimited. May we always be conscious of them and equal to them.

Higher Standards of Street Lighting for Suburban Districts



Efforts of the industry to increase the standards of street lighting have borne fruit in California. The above photograph shows an installation of Westinghouse equipment in a suburban section of a southern California city. It is typical of the double luminaire type installation in better residential sections where streets are parked in the center.

Station B of the Portland Electric Power Company at Oregon City, Ore. Part of the equipment has been in service since 1894 and most of it since 1897.

Western Hydroelectric History

I—Station B, Portland Electric Power Company

By W. C. Foster

Assistant Operating Engineer, Portland Electric Power Company, Protland, Ore.

MORE than thirty-two years continuous service is the operating record of Station B of the Portland Electric Power Company, one of the oldest hydroelectric generating plants in the entire Pacific Northwest. This plant is located on the Willamette River at Oregon City, about 15 miles south of Portland, Ore. The first three units were put into operation in 1894 and still are operating. They are known as General Electric type TY-20 and originally were rated 450 kw., 3 phase, 6.6 kv., 33 cycles at 200 r.p.m. They are of the revolving-armature type having the three collector rings and copper leaf brushes mounted at the top of the machine. Details of these machines may be gathered from the accompanying illustrations.

Each generator is direct-connected to a 42-in. water wheel and also is connected to a 60-in. water wheel by means of a 48-in. leather belt. The original exciter machines were 125-kw., 500-volt, vertical d.c. generators, direct-connected to 48-in. water wheels. The scheme of having the two different water wheels attached to each generator was designed to care for fluctuating stream conditions. Normal maximum operating head during low-water periods is about 40 ft. However, under high-water conditions in the Columbia River water is backed up into the Willamette River as far as the Oregon City Falls and to an extent that reduces the operating head on the plant to as low as 20 ft. or even less under extreme conditions. The operating plan was to use the 42-in. wheel on high heads and the 60-in. wheel on low heads.

In 1897 the original power house was extended to accommodate an additional 7 units Four of these generators, identical to those installed in

1894 with the exception that the operating voltage had been raised to 10 kv., were placed in service in that year. In 1903 two 540-kw., 3-phase, 10-kv., 33-cycle, 143-r.p.m. horizontal machines were installed, each direct-connected to a 51-in. double-runner water wheel. Also about that same time all of the original generators were rewound to change the operating voltage from 6.6 kv. to 10 kv.

During the first nine years of operation of this plant each individual generator was connected through some 15 miles of transmission line to its own particular block of substation apparatus in the Portland substation. This original Portland substation occupied the ground now covered by the Electric Building at Seventh and Alder Streets. At the time that the original generators were rewound for 10-kv. operation, new panels were provided, open knife switches were discarded for oil circuit breakers and arrangements were installed permitting the machines to be paralleled to a common bus within the station. At that time also the exciting system of the station was changed from a 600-volt basis to a 125-volt system supplied by two 85-kw., 125-volt d.c. generators, belt driven from water wheels. The 600-volt d.c. generators thus relieved from excitation service were switched over to electric railway service, serving principally the electric interurban trains operating between Portland and Oregon City.

At still a later date, two 600-volt, d.c., 500-kw. Allis-Chalmers generators were direct-connected to the 60-in. water wheels on two of the original units. These new d.c. generators replaced the old original 600-volt generators initially installed for excitation service and subsequently switched to railway service. For governing and load regulating purposes the 60-in. water wheels thus direct-connected to the two new d.c. generators were left tied in mechanically with the 33-cycle a.c. generators on the corresponding 42-in. wheel through the 48-in. leather belt previously mentioned.

Since these a.c. machines were tied into the station bus, each carrying its proportionate share of the station load, they served to regulate quite definitely the speed of the d.c. units attached to the corresponding 60-in. wheels. This mechanical combination gradually obviated the operating difficulties incident to the sudden increase or decrease of the d.c. railway load. Prior to this arrangement a sudden rejection of load on the railway system permitted the d.c. water wheel-driven generator to run away and quite frequently flash over causing some damage and delay to service. With the mechanical tie arrangement, the sudden rejection of d.c. load is compensated for by the corresponding a.c. generator picking up a greater share of the station a.c. load. In other words, the sum of the loads of the two units tied together is practically a constant quantity. The original 600-volt exciter units were rewound for 125 volts and now are in service supplying part of the excitation load of the station.

This old plant now is looked upon with some curiosity because of its design and the early type of machinery installed.. The early operating features of this plant offer a most interesting comparison with modern power station operating methods and equipment.

In the early days of the station when the generators were working at 6.6 kv., oil circuit breakers were unknown and 3-pole open knife switches mounted on marble panels served the only means of disconnecting a generator from its transmission line. This was not a particular drawback at that time because, as before noted, each generator supplied its own particular line and its own particular group of substation apparatus at the receiving end of its individual transmission line. Therefore it was not necessary to do any synchronizing because the only tie between generators was on the d.c. side of the rotary converters at the receiving

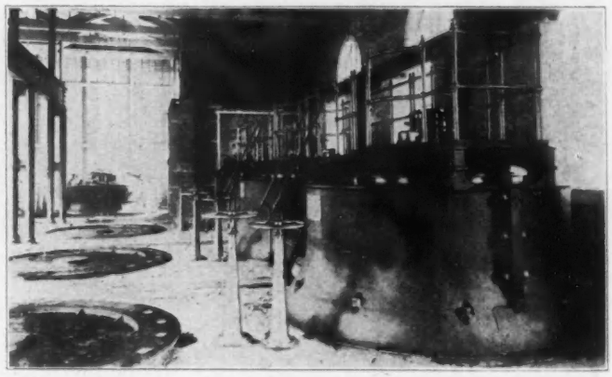


Fig. 1. Generators No. 1, 2 and 3 at Station B, Portland Electric Power Company, Oregon City, Ore. These 450-kw., revolving-armature machines were placed in service in 1894 and still are delivering kilowatt-hours to the system.

substation. Further than this, switches were not normally operated under load conditions, but served merely as a means of disconnecting a unit from a line and possibly connecting it to some other line for certain emergency conditions. Part of the generators served lighting loads through the substation and part of them served the d.c. system through rotary converters. Consequently the generators were known respectively as "rotary machines" or "lighting machines."

All of the operation was controlled from the substation by means of a telephone and a call-bell system. The call-bell system was a series 500-volt d.c. arrangement including in the circuit the gongs at the generating station and at the substation together with the switches necessary to control the impulses on the line. Various code signals were worked out whereby information regarding load regulation and the starting and stopping of machines could be conveyed to the hydro operator when the telephone line was out of commission.

When it was desired to start up a new machine the substation operator closed the proper a.c. switch connecting the proper line to that machine and then advised the hydro operator who made similar connections at his end of the line. Then the wheel tender on the lower floor of the generating station received a clearance signal to operate

the gate to start the generator. As the generator came up to speed the rotary was supposed to start up and follow along. When the rotary failed to start, the substation operator would give the armature a boost, using a stick as the necessary lever. As soon as the generator and rotary came up to the proper speed the substation operator closed in his field circuit and noted the polarity on the d.c. end of the rotary. If this polarity happened to be wrong it was necessary to shut down both rotary and corresponding generator and start all over again. This process might happen two or three times in succession. After the machines were up to speed and the polarity correct at the substation, the substation operator so indicated to the hydro operator and proceeded to cut the rotary in on the d.c. system. As soon as the rotary

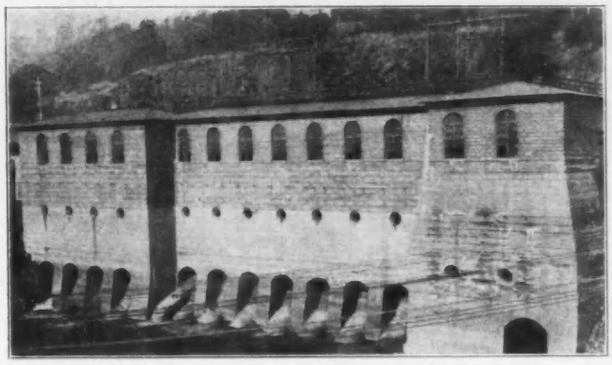


Fig. 2. Station B of the Portland Electric Power Company at Oregon City, Ore.

was connected to the d.c. system the generator operator built up the load according to instructions from the substation. Ammeters on the generator panels at the power house were used for load indication and operating voltages were maintained at such values as would give from 550 to 600 volts on the d.c. side of the rotaries. Power factor was not considered.

In addition to the transmission lines to the Portland substation there was a line serving a comparatively large load at the Portland Flouring Mills and a small motor load at the Southern Pacific shops. This load originally was handled on one generator but subsequently grew to proportions demanding two generators on the line. Synchronizing then was done with lamps and the 3-pole open knife switches on the generator panels. The operation sounds simple but old time operators will know that it was no easy job. The system of operation between the power house and the flour mill was similar to that between the power house and the substation.

It was necessary to make all of the electrical connections and then start the generator, bringing up with it the motor at the flour mill. During this starting period the flour mill load was removed from its motor by means of a mechanical clutch arrangement. This of course meant that the entire load was thrown on to the generator at once, imposing severe operating conditions. It was necessary for wheel tenders to be waiting at the gate wheel of the 60-in. runner in order to throw into service the 60-in. wheel for the initial starting period when the flour mill load was dropped on. The 42-in. wheels were governor controlled but the operating characteristics of the governors were such that as the generator slowed down the governor action also slowed down. To offset the initial load condition just mentioned it was necessary for the operator to throw water into the 60-in. wheel to provide additional starting torque. Due to the incident surge it was necessary often to repeat this starting operation two or three times before the motor and generator would remain in step and pick up the load properly. Later on as additional load was added at the mill it became necessary to operate the 60-in. wheel regularly during the load period in order to provide a suitable governing range on the 42-in. wheel.

The failure of a trolley wire adjacent to the substation frequently caused the rotary converters to kick off, resulting in overspeed and common flash overs on the machines at the generating plant. This difficulty was particularly acute during the period when the 600-volt d.c. generators originally used for exciter service were cut over for railway service, serving interurban trains between Portland and Oregon City. It was a frequent occurence for a heavy freight starting on a grade or under other heavy load conditions to pull down the speed, causing the slow-acting governors to open the gates wide in order to bring the generator back up to speed. Then upon sudden reduction of power demand the slow-acting governors could not slow down the generator in time to prevent

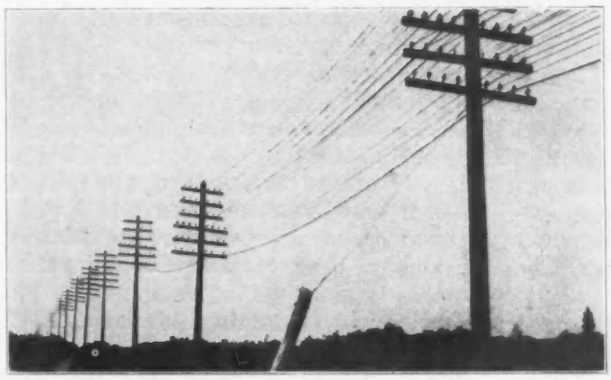


Fig. 3. Old transmission line from Station B to Portland, carrying one circuit for each of the nine generators.

flash over and consequent service interruption. This particular condition, however, was overcome when the railway generators were mechanically tied to the a.c. generators as already mentioned.

During its long life Station B has been the scene of many interesting occurences. It still is turning out kilowatt-hours and thus retaining its title of one of the oldest operating hydroelectric plants.

Safety on Construction Jobs

Educational Efforts Fully Justified

By D. H. Redinger*

Resident Engineer, Southern California Edison Company, Big Creek Project

"IT can't be done" is the usual answer to a suggestion of safety education on construction jobs. However, Mr. Redinger has proved the fallacy of this belief by the results that he has obtained with his Big Creek construction organization. Mr. Redinger has made safety education pay dividends to all concerned and is qualified to speak authoritatively.

SAFETY in industry and safety on construction work have the same relationship as the father to the son. Experience has taught established industry the great economic and humanitarian value of safety as well as the increase in efficiency derived therefrom. By comparing the father with established industry which has learned by experience this great value, we shall compare the son to construction work in which so many excuses are made relative to the success of safety in the field.

It is true that we find a large percentage of men in the construction field who shift from job to job and feel satisfied to exist from day to day. This is the type of man who takes little interest in safety and does not want to be bothered with it until he sustains an injury. At such a time, if he can find where the company for which he is working overlooked some safety detail, he will see to it that the whole world knows about it and will leave nothing undone in the way of placing responsibility upon someone other than himself.

For these reasons alone safety methods on construction work are more important than in the established industry where men have more time to absorb their benefits and, if not prone to accept safety, it naturally grows on them. Again we find the type of men who have families and where, should an accident occur either fatal or resulting in permanent disability, their families become public charges. Another important factor in safety on construction work is the elimination of the improper publicity gained through construction accidents. The outside world gathers the impression that the lives of the men mean nothing, that protection is not provided, that construction projects are built on human lives and ruled by iron men; all of which is not true. Also, we find ourselves confronted with the financial loss to the employee and employer as well as the public. This, coupled with the humanitarian spirit, that just as many hearts are turned sad by the loss of this type of man as any other type, makes it worth while to make safety as distinct a job as any other in the construction field.

In this country safety work still is in its infancy. It was inaugurated a few years ago by the National Safety Council, a volunteer organization whose work in the beginning consisted of the installation of every known device for preventing accidents. At that time a few established industries began to safeguard machinery by safety appliances with the result that almost every established industry today recognizes safety as one of the greatest assets to its success. However, the above-mentioned safety movement which started with the mechanical safeguards has developed a great reduction in accident frequency. Yet the desired results were not accomplished and all safety movements have resulted in the same conclusion, namely, that while mechanical safeguards are essential the majority of accidents are due to the ignorance and carelessness of individuals. Therefore, to secure the greatest results, safety educational campaigns are being started, maintained and made universal.

The educational propaganda for safety on a universal scale was started by the railroads throughout the country with their "Stop, Look and Listen" signs at railroad crossings. This was followed by safety posters or bulletins which have become a great help and very popular. The use of posters to point out means to avoid accidents or injuries is the first step of a safety education.

The Southern California Edison Company has established and maintains at Big Creek a safety department with a full-time safety engineer who makes continual inspections, recommendations and reports to the resident engineer. This department functions through the Big Creek accident prevention committee which is composed of the resident engineer as chairman, the safety engineer as secretary and the department heads as the other members. This committee meets once each month and discusses all items of safety which arise or are referred to it from the local camp accident prevention committee. Each camp has such a committee with the respective camp foreman as chairman and a secretary, both of whom are permanent members. Four additional members are selected and rotate so a new member is appointed and serves at each meeting. This rotation enables a greater number of employees to serve on the committees. Hence the distribution of

* From paper prepared for the Engineering Section, Pacific Coast Electrical Association.

safety education covers a larger number of men than otherwise could be reached. They, too, meet once each month and make recommendations for safety in the camps. Minutes are made of the meetings of all committees for the information of members as well as for that of the management of the company showing the attitude and final disposition of all safety matters on the construction job. To further the educational program motion picture shows, bulletins, safety lectures and first-aid instructions are given from time to time.

Now that organized industry is teaching as a father, so must construction work learn as a son. Entire volumes have been written in recent years on safety and safety methods, and few topics connected with the industry have received more attention or made more rapid progress. The prevention of accidents to our construction workmen has not reached as high a plane of efficiency as we desire.

On many construction projects safety work still is more or less neglected, but its importance cannot be over-estimated, and it is needless to say we are forced to believe that safety must be observed. We are familiar with the laws regulating safety methods as well as regulating compensation to be paid to the injured and are happy to say the conditions of safety on construction have demonstrated their true value. The application of safety is the one great connecting link which protects the type of men who otherwise would not have the opportunity to gain this benefit.

Due to the shiftless nature of this type of men, great care must be made in the selection of foremen and sub-foremen who have the positive contact with the men. A great many papers have been prepared, read and discussed on the responsibilities of the foreman. True, on all work progress is wanted and must be made, yet safety must be maintained at any cost. So in the past reference comparing the son to the construction work we find it is a constant job to educate as well as to keep step with all the safeguards needed. Therefore, the selection of a foreman who is able to lead, teach and hold the respect of his men for their safety is essential. Often a foreman working with men of the type described, when advising safe working methods, is met with a retort of this kind: "Oh, it won't make any difference if I do get killed. There won't be anything lost." When a man makes this assertion all the reserve safety educational ability of the foreman is needed to show him that more than his life is at stake, that the lives of others and the humanitarian interest of the company are involved as well as the financial loss to both the employee and employer. Again, familiarity often breeds carelessness, hence continual effort on the part of the foreman must be exercised.

You readily may see that it is much easier to establish safety in an industry that is more or less permanent and where men spend years in the same plant than it is in construction, where the latter covers rough work and temporary jobs coupled with the short periods of time necessary to complete, but it can be done if proper attention is given to it. With the more permanent nucleus of a construction organization rests the responsibility of safety, and each department head, foreman and sub-foreman must exercise every effort to instill this important subject in the workman. All this, with the co-operative and safety spirit of the safety engineer backed by his superiors, means the success of safety methods on construction work.

"Every construction job's safety welfare neglected is a continual drag on the forward march of civilization in the world today."

Progress in Apartment Electrification Made by Portland Utilities

INTERESTING because they indicate the trend in domestic electrification in Portland are the figures, compiled by one of the utility companies of that city, on cooking and refrigeration installed in the sixty-six new apartment houses built in Portland during the first nine months of this year. These sixty-six buildings contain 1,362 apartments, and among these, fifty-eight buildings containing 1,210 apartments have installed electric ranges as against eight buildings with 152 apartments that installed gas ranges. Computed on the number of apartments this figures 89 per cent using electric cooking against 11 per cent using gas.

Considering that the Portland Gas & Coke Company, with comparatively low rates on gas, is always an active competitior, this high percentage of electric cooking saturation in new apartments speaks exceedingly well for the sales work, past and present, of the Portland Electric Power Company and the Northwestern Electric Company, both of which shared in the sale of by far the greater bulk of this electric range business.

Slightly less striking though in many respects more notable, is the fact that in thirty-nine of the buildings electric refrigeration was installed. This resulted in equipping 856 apartments, or 63 per cent, with this more recent and less well-known development in electrical aid to domestic science. Of this business over two-thirds was divided between the power companies, refrigeration dealers securing the balance.

Statistics Compiled on Number of Wired Homes in Foreign Countries.—Switzerland has the highest percentage of wired homes of any country in the world according to figures compiled by the Electrical Equipment Division of the Department of Commerce. As against the 56 per cent of homes in the United States wired, Switzerland has 400,000 of its 415,000 homes wired or a percentage of 96.5. Four other countries exceed the percentage for this country. These are Japan with 73.4 per cent; Denmark, 72 per cent; Canada, 62.3 per cent and New Zealand, 59 per cent. The nearest to approach the total number of wired homes in this country is Japan which has 8,140,000 domestic consumers. The poorest showing among the European countries is made by Greece which has only 1 per cent of its homes wired. With the exception of Japan the showing in the Asiatic countries is poor.

CENTRAL STATION CONSTRUCTION OPERATION AND MAINTENANCE

Long Span Construction Simplifies Distribution

330-ft. Secondary Spans Effect 67 Per Cent Pole Saving and Facilitate Stringing of Service Leads

By H. H. Kerr, Superintendent Electric Department, Public Service Company of Colorado.

Study of distribution economics in the city of Denver has brought about the design and adoption by the Public Service Company of Colorado of a one-pole-per-block scheme utilizing 330-ft. spans. This long-span distribution construction was worked out first for rural territory and subsequently adapted to city problems. While practically all of Denver's distribution system is carried in alleys it is an item of vast saving in first cost and in maintenance costs to reduce the number of poles per 660-ft. block from six to two. This is accomplished by the new system, which also results in greatly improved neighborhood appearance. The only places where extra poles are necessary are at dead-ends and at alley intersections where the strain must be taken up before making a tie to the transverse pole line, sufficient side guying being impossible on the transverse line.

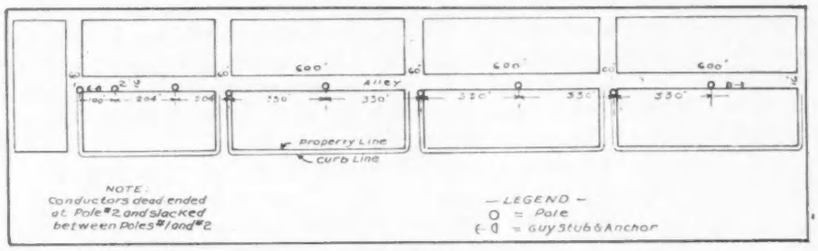


Fig.1. Plan of 4-block section of long-span distribution system showing the uses of only one mid-block pole and the method of guying at T alley intersections.

Features

The features of this scheme are the use of No. 4 steel-reinforced aluminum cable for the primaries, the use of a 3/8-in. steel messenger cable to support the No. 4 weatherproof copper used for secondaries, and the support of the secondaries at 110-ft. intervals by brackets attached to the messenger. Secondary distribution is three-wire 110/220-volt, the steel messenger serving as neutral ground lead. Clearance distances and general construction details are shown clearly in the accompanying illustrations.

Service drops may be handled much more expeditiously from the messenger than from the usual intermediate poles. With poles there is but one point from which service leads may be taken off for any one group of dwellings regardless of what obstructions may intervene. With the messenger it is possible to drop service leads from any point convenient for a straight unobstructed run to the building to be served. The secondary wires are supported at two points in the span by 2-spool racks attached to the messenger by means of a piece of strap bent into an inverted V and bolted to the messenger. To prevent the secondaries from being whipped over or around the messenger in cases of heavy winds they are carried on pins located in the outside positions of a 4-pin arm at each end of each span.

Service drops are carried in opposite directions from coincident points on the messenger wherever possible in order to equalize the side strain. The hot wire of the service lead is suspended from the messenger by means of spool insulators and is tapped by means of a short jumper to either side of the 220-volt secondary as conditions dictate. The neutral or ground lead of the service is attached directly to the steel messenger by means of Crosby clamps. In making service-lead connections it is necessary only to stand a ladder up against the messenger. A ladder of sufficient length and fitted with hooks to prevent the messenger slipping from under the upper end of the ladder is used.

To compensate for the uneven strain that is common in adjacent spans the messenger is anchored to each pole. A suspension clamp and eye-bolt holds the messenger, prevents creeping and provides flexibility that should obviate crystallization.

Advantages

Outlined briefly the advantages accruing from this type of construction are as follows:

1. Fewer poles required, reducing first cost, maintenance, and capital charges.

2. With 330-ft. spans in blocks of 600 ft. with 60-ft. streets there can be but one pole per block to interfere with garage entrances, etc.

3. In Denver the city requires a deposit of $5 per pole for placing or moving in paved alleys and 50 cents in unpaved alleys. The saving in using only one instead of five intermediate poles per block is obvious.

4. Service loops may be taken off at any convenient point avoiding interference with trees, buildings, or other obstructions, and resulting in shorter leads with attendant saving in copper and line loss.

5. Property crossings of service leads and incident petty disagreements and differences are practically done away with.

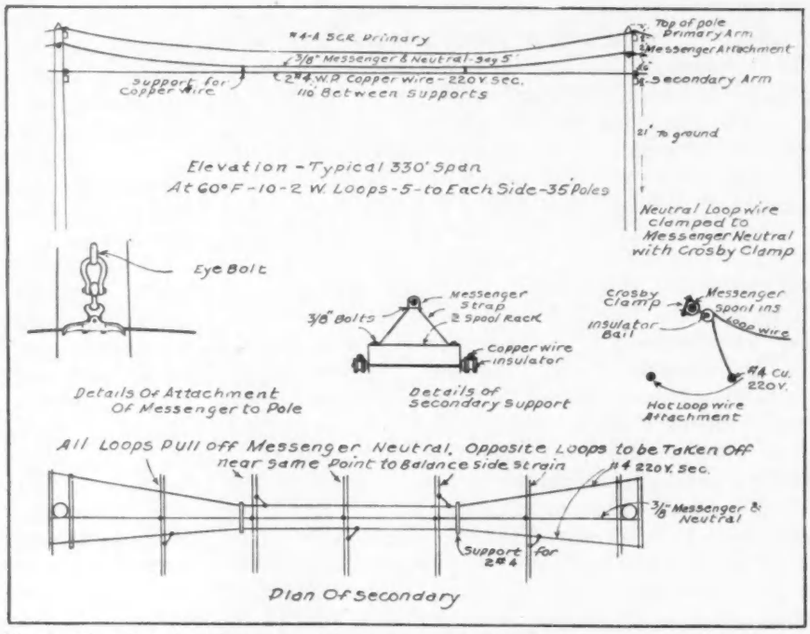

#4-A S.C.R. Primary
3/8" Messenger & Neutral Guy 5'
2 #4 W.P. Copper Wire - 220 V. Sec.
110 Between Supports
Support for Copper Wire
Top of pole
Primary Arm
Messenger Attachment
Secondary Arm
21' to ground
Elevation - Typical 330' Span
At 60° F - 10-2 W. Loops - 5 - to Each Side - 35 Poles
Neutral Loop Wire Clamped to Messenger Neutral with Crosby Clamp
Eye Bolt
3/8" Bolts
Messenger Strap
2 Spool Rack
Copper wire insulator
Crosby Clamp
Messenger
Spool ins
Insulator Rail
Loop wire
#4 Cu. 220 V.
Hot Loop wire Attachment
Details Of Attachment Of Messenger to Pole
Details of Secondary Support
All Loops Pull off Messenger Neutral, Opposite Loops to be Taken Off near same Point to Balance Side Strain
#4 220 V. Sec.
3/8" Messenger & Neutral
Support for 2 #4
Plan Of Secondary

Fig. 2. Plan (below) and elevation (above) of a single 330-ft. secondary span showing scheme of construction and showing also (center) certain details.

6. Costs are nearly the same as realized through joint construction with communication companies.

7. All restrictions incident to joint construction are avoided.

8. Power company has complete ownership of all poles.

Disadvantages

The outstanding disadvantages may be summarized as follows:

1. This type of construction can be applied only to pole lines carrying but few classes of service.

2. Use is restricted by local geography.

3. Particular care must be exercised in guying.

The strain of conductors not supported by messenger is such that crossarms to which they are attached must be guyed to suitable stubs and anchors at all dead ends. Since the strain in the secondary conductors is reduced by supports intermediate in the span crossarm guying is not necessary in this case. A suitable anchor capable of withstanding the maximum messenger strain is all that is necessary where there is secondary service only. Where alleys are so located, as at T intersections, that proper guying facilities are not obtainable it is necessary to install a short-slacked span, the alley lead being anchored within such span before attachment to the transverse line at a self-supporting corner pole.

Saw Speed Readily Controlled by Simple Equipment

By H. H. LIGGETT, Electrical Superintendent, Hutchinson Lumber Company, Oroville, Calif.

Different classes of timber require the operation of head saws at different tooth speeds. Experience has proved that a tooth speed of about 9,500 ft. per minute is well suited to pine or other soft timber but is entirely too high for red fir or other harder woods.

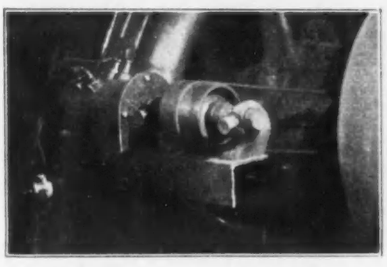


Fig. 1. Showing method of attaching rotating speed-control relay to motor frame. Belt drive facilitates adjustment without shutting down band mill.

The latter material is best handled at a tooth speed of about 8,000 ft. per minute.

Both grades of lumber are handled, as they come in, at the Hutchinson Lumber Company plant at Oroville, Calif. Inasmuch as the major portion of the material handled is pine, all head-saw speeds originally were based upon values suitable for the soft wood. Experience showed that attempts to saw fir logs with the higher saw speed and with the same rate of saw-carriage movement resulted in "snaky lumber" as the result of sawdust packing in behind the teeth of the saw.

Speed control obviously being necessary in order to permit the sawyer to reduce his head-saw motor speed when cutting hardwood logs, a device was rigged up that is giving excellent service. The first step made was the introduction of a block of resistance into the motor circuit, controlled by a contactor and push button.

This method was only partially successful due to the fact that the heavy flywheel effect of the band saw and pulleys rendered impossible the desired rapid changes in speed. Further than this experience proved that with the resistance in the circuit the speed curve of the motor and head saw would "break" frequently and badly on heavy cuts. Thus it became evident that some automatic means of maintaining definitely the desired slower speed would be necessary. Further, it was obvious that such equipment to be efficient under the circumstances must operate without attention when once set for a definite speed.

Several devices and combinations were tried out with varying degrees of success. A G.E. type TDSL-7 speed-control relay finally was decided upon and used in conjunction with an extra block of secondary resistance, a magnetic switch and operating relay. This equipment has given satisfactory operating results. The speed-control relay as it appears when mounted on the head-saw motor is shown in Fig. 1. A complete wiring diagram of the control device showing its method of application to the head-saw motor control is shown in Fig. 2.

In Fig. 1 it may be noted that the relay shaft is driven by means of a belt and pulley rather than by direct connection. This method of mounting was decided upon because it permits the relay to be removed from operation simply by slipping the belt over to the idler pulley appearing at the right. With the relay thus shut down it is possible to adjust its contacts to give any desired speed or to do any necessary maintenance work on it without shutting down the band mill.

Cycle of Operation

As a further explanation of this equipment the cycle of operation may be of interest. Assume that the sawyer is cutting pine and thus the motor is operating at full speed with all secondary resistance cut out. Under these conditions the sawyer's speed-control switch is in the high-speed position and the drum controller is in the full running position. To switch this condition to permit the head saw to be used on fir logs the first operation is to move the drum-controller handle to the required setting for the lower operating speed. The second operation is to throw the speed-control switch to the low-speed setting.

The results of these operations are as follows: Motor speed is reduced by the introduction of resistance incident to the lower position of the drum controller. Then, if the speed falls below the desired low value the contacts of the speed-control relay close, causing the operation of contactor A (Fig. 2) energizing the operating coil of the 300-amp. contactor B (Fig. 2). When contactor B operates closing its contacts it shunts out a block of regulating resistance thereby causing the motor speed to rise. Conversely if the motor speed goes too high the speed-control relay contacts open and the block of regulating resistance again is cut into the circuit and the motor speed dropped. This cycle of operation is repeated at a rate depending upon the rate of cutting speed and the size of the particular log being handled at the moment.

When the sawyer desires to increase the speed of the head saw to full value it is necessary only to reset the drum-control handle to full position and to throw the speed-control switch to the high-speed setting.

It may be noted from the wiring diagram shown in Fig. 2 that all control-circuit power is taken from the motor terminals. Thus all control circuits are totally de-energized whenever the motor is cut out of service. Practically any speed within reasonable requirements may be obtained by simple adjustment of the speed-control relay and the controller handle.

Electric heating units used to preheat the air supply of an air-operated shovel on the Great Northern Railroad tunnel project have greatly increased the efficiency of the equipment. Prior to the installation of these electric heaters much trouble was experienced due to the freezing of the exhaust ports in the large power shovels as a result of the cooling effect of the expanding exhaust air. The introduction of a set of electric heaters in the air receiver tank on the shovel has entirely overcome this difficulty and increased the operating efficiency by this relief from freezing and also due to the increased air pressure incident to the higher temperature of the air-receiving tank. Operating records show that the net cost of the power consumed for this elastic heat is extremely low.

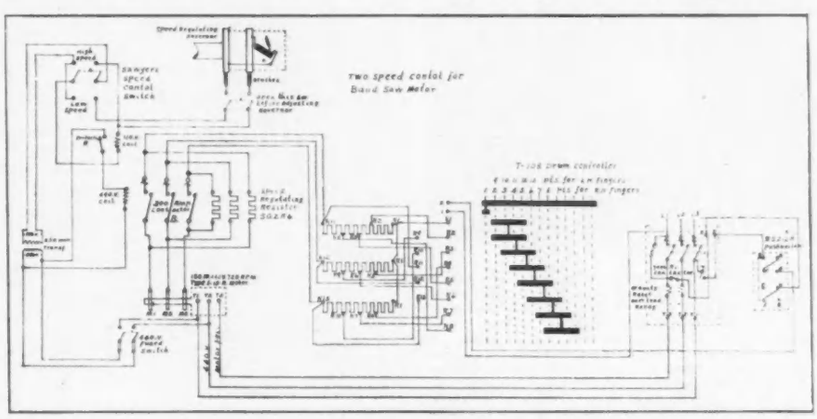


Fig. 2. Complete wiring diagram of band-mill electrical control showing method of inserting controlling relay, contactors and resistances.

Three-Phase Voltmeter to Check Potential Fuses

By L. F. HUNT, Development Engineer, Southern California Edison Company

A blown fuse in a potential transformer circuit may cause improper synchroscope operation. Some time ago the Southern California Edison Company experienced some trouble with 60-kv. fuses in potential transformer circuits. These fuses in many cases failed without there being any apparent voltage drop as indicated by station instruments. In cases where two potential transformers are used and one used for synchronizing it is very likely that a fuse failure will cause a very erroneous indication of phase relations.

Some means of checking these possible conditions at the switchboard was desired. Accordingly a 3-phase voltmeter was devised. This voltmeter is so arranged that it gives a zero indication when the three phases are equal and 120 deg. apart. However, when a phase shifts or a phase voltage changes the meter indicates such changes.

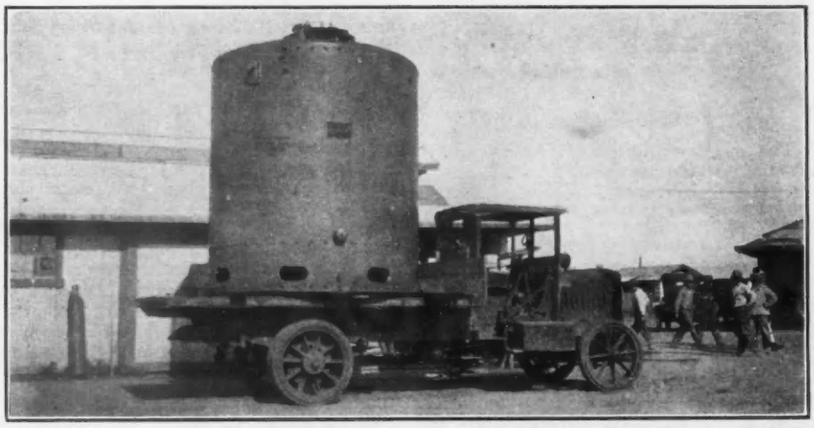
When this special instrument is energized from one single-phase source accurate readings can be obtained. Therefore, if the ordinary single-throw synchronizing switches on the switchboard are arranged to be double-throw, the condition of 3-phase voltage can be checked by throwing the switch in one direction. By throwing the switch in the other direction single-phase voltage may be impressed upon the synchroscope for synchronizing purposes. This scheme permits a ready and rapid voltage (fuse) test practically at the moment the synchronizing is to be done, insuring correct indication.

A test check of the 3-phase voltmeter as described above was made on the Bandini 60-kv. line out of the Laguna Bell substation. With fuses open as indicated in the table below, 3-phase and single-phase voltages were as shown in the table: (Refer also to accompanying illustration.)

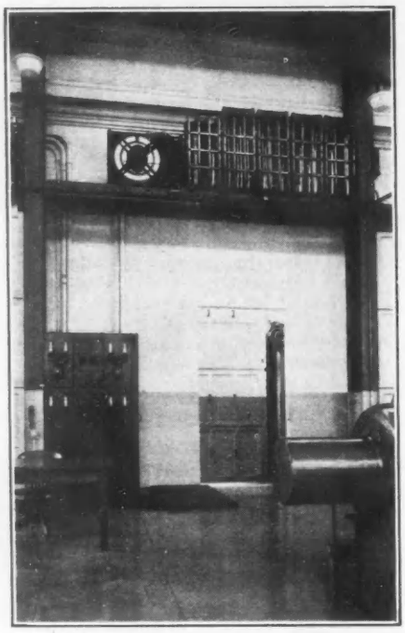
Fuses Opened	3-Phase Volts	1-Phase Volts
None	0	103
A	—43	103
B	—65	103
C	50	98
D	—70	98
A & B	92	103
B & C	—20	98
C & D	—90	0
A & C	50	98
A & D	76	98
B & D	50	98

Construction of the 3-phase voltmeter is indicated in the schematic diagram shown in the accompanying illustration; wiring diagram also is shown. The instrument itself is a 3-phase, zero-center indicating wattmeter, the elements of which are rewound for voltage, instead of current, and connected as shown. The 3-phase 110-volt source energizes the 3-phase end of the Scott or T-connected bell-ringing transformers. These bell transformers are rewound so as to give equal voltages on the 2-phase side. One of the phases of this 2-phase source energizes one set of coils in the voltmeter and the second of the two phases energizes the second set of voltmeter coils. Thus when the two voltages are equal the opposing torques of the two coils of the moving element of the 3-phase voltmeter cause a zero indication. It is obvious that any unbalance in voltage will cause a tell-tale rotation of the instrument pointer.

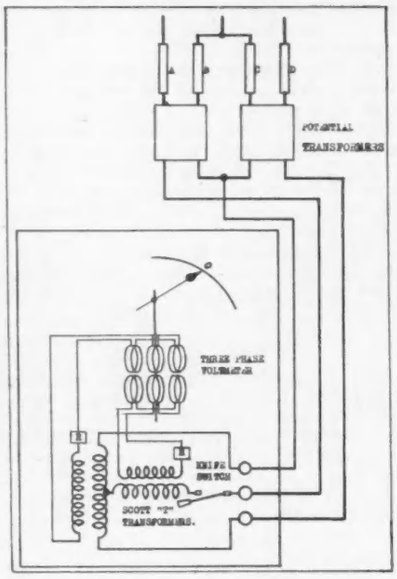
The instrument serves in many applications where it is desired to know if the three phases of a 3-phase system are equal and 120 deg. apart. Standard equipment may be used and the changes necessary are simple.



Oil circuit breakers are not what they used to be, as is evidenced by the view above which shows one of three tanks of a new Westinghouse, 220-kv., type G-2 switch being moved into Vaca-Dixon substation of the Pacific Gas and Electric Company. This switch is rated at 20,000 amp. for 5 min. and has an interrupting capacity of 3,100 amp., both at 220 kv.



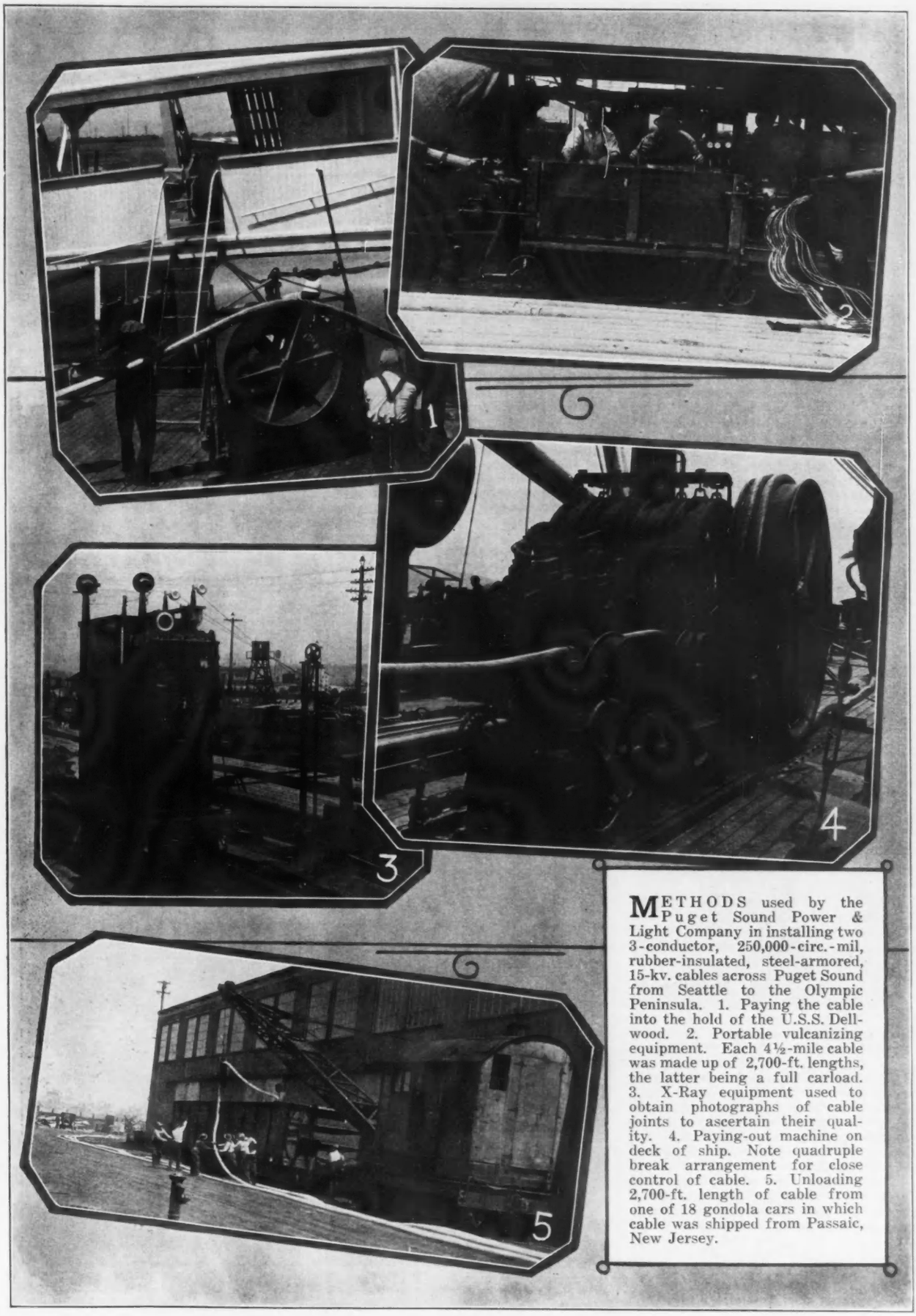
It is desirable to mount field resistors where they are accessible and where the face-plate at all times is visible to the machine operator according to present-day standards. This is accomplished with an economical use of space as shown above, where they are mounted upon one of the members of the steel frame of the building. The crane girder and a projection from the wall serve as partial protection from dust. The installation shown is at the Newark substation of the Pacific Gas and Electric Company.



Wiring diagram and schematic arrangement of 3-phase voltmeter

Increased Use of Creosoted Pine Poles.—The use of pressure-creosoted pine poles in 1924 showed an increase of nearly 100 per cent over the 1923 figures, according to the Service Bureau of the American Wood-Preservers' Association. The following statistics, covering pressure-creosoted pine poles for each of the last eight years, have been compiled by R. K. Helphenstine, Jr., of the U. S. Forest Service in cooperation with the above association. Figures on creosoted pine poles as a separate class never before have been given out.

Year	No. Treated
1917	103,804
1918	67,541
1919	156,346
1920	167,289
1921	224,777
1922	291,991
1923	451,852
1924	899,201



METHODS used by the Puget Sound Power & Light Company in installing two 3-conductor, 250,000-circ.-mil, rubber-insulated, steel-armored, 15-kv. cables across Puget Sound from Seattle to the Olympic Peninsula. 1. Paying the cable into the hold of the U.S.S. Dellwood. 2. Portable vulcanizing equipment. Each 4½-mile cable was made up of 2,700-ft. lengths, the latter being a full carload. 3. X-Ray equipment used to obtain photographs of cable joints to ascertain their quality. 4. Paying-out machine on deck of ship. Note quadruple break arrangement for close control of cable. 5. Unloading 2,700-ft. length of cable from one of 18 gondola cars in which cable was shipped from Passaic, New Jersey.

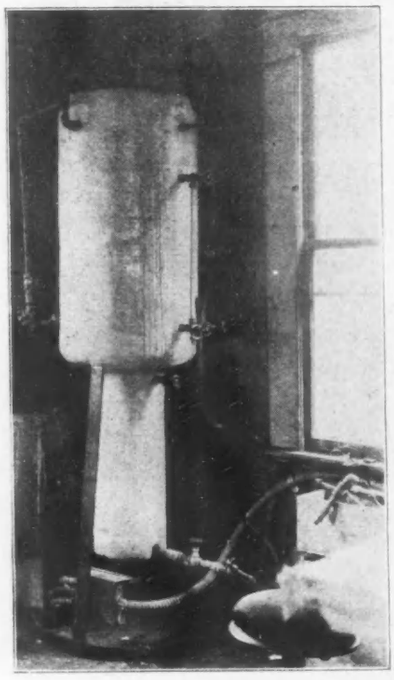
IDEAS FOR THE CONTRACTOR

Electric Steam Generator in Pressing Shop

Many Advantages to Steam from Sterilizer Unit for Pressing Clothes and Costs are Nominal

Among the possibilities for the use of the electric steam generator aside from the most general use in connection with dairy sterilizers, is the possibility for using such apparatus to supply steam for clothes-pressing machines. Considerable experimentation along this line has been done in the Northwest and a number of successful installations have been made.

An opportunity to get complete data as to operating costs of such an installation has been presented, however, in Paso Robles. The Paso Robles



Steam generator such as used for dairy sterilizers in use in clothes pressing shop.

Vapor Cleaner Company, a dry cleaning shop, uses a San Joaquin sterilizer steam generator for supplying steam to its pressing machines. Although the installation was somewhat in the nature of an experiment, it has proved very successful.

The steam generator provides steam for two pressing machines and for a drying house. A 15-kw. generator is used, automatically controlled. Automatic control is provided by General Electric C.R.-7007-83 magnetic switches. Its capacity is equivalent to 2½ or 3 hp. No license is required of the owners from the Industrial Accident Commission since the patentee of the equipment assumes this responsibility.

The equipment is wired on single-phase 220 volts, and so far the electric bills have been in the neighborhood of $30 a month. The electric steam generator eliminates the great danger from smoke and ashes formerly necessary with other types of steam generators. A much cleaner shop is possible and a great deal of time is saved, no fueling being necessary. Formerly a wood boiler was used in this plant and required considerable attention. With the electric steam generator it is not necessary to clean it out. The steam boiler is blown out about once a week and that is all the attention necessary.

Steam pressure is kept to 100 lb. at all times. The boiler is lagged with 3-in. lagging, keeping the shop cool for the men working near it. An individual meter was installed on the generator in order to obtain the 1.3 kw-hr. rate of the Midland Counties Public Service Corporation, serving that territory.

The steam generator is of the solid tube type with brazed joints, so that there is no chance of rivets giving away or of corrosion. Steam pressure is kept unform at all times very easily and the boiler is very economical on the use of water. The installation was made by B. P. Bretherton, Electragist, of Paso Robles. An accompanying table shows the meter ratings over a period of three or four months operating costs and the kw-hr. con- and gives a good indication of the sumption.

The use of the electric steam boiler in connection with pressing machines would indicate that a much more extensive field for such installations is open. There are a large number of steam pressing plants in use in practically all parts of the West. Considering that the steam boiler at the Paso Robles plant operates two pressing machines and a drying room and that the installation provides great saving of time and makes for a much cleaner pressing plant, the cost of operation compares very favorably with any other fuel.

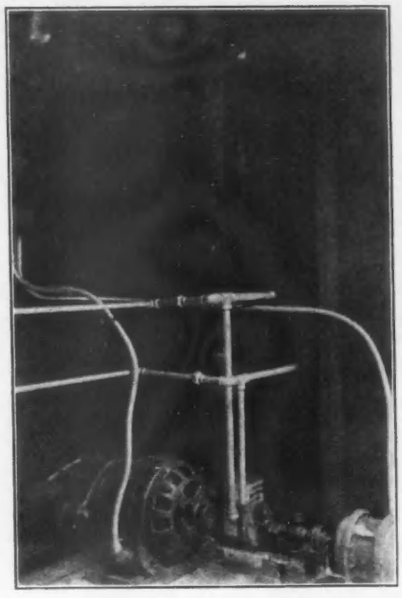
Operating Costs on Electric Steam Generator for Clothes Pressing

Installation, 1 15-kw. boiler. Serves 2 pressing machines and drying room.

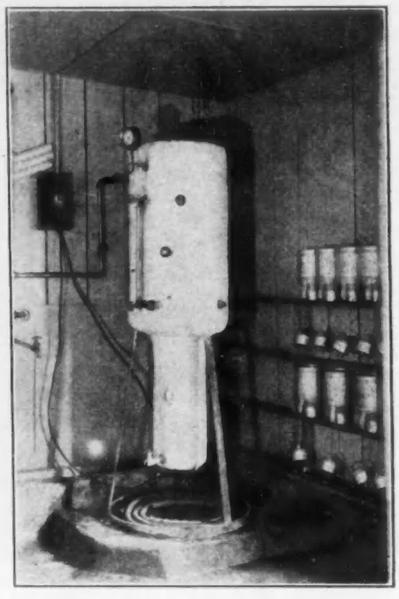
Date	Readings	K	Consumption	Amount
1-20-26	3220	20	1660	$26.45
2-19-26	3328	20	2160	31.38
3-20-26	3477	20	2980	42.04
4-20-26	3610	20	2660	37.88

Electric Dairy Uses Motors and Steam Generator

As an example of complete electrification of the small dairy, the Holstein Dairy Company of Santa Maria, Calif., demonstrates to what extent electricity may be used about the premises of a modern dairy. Not only is the equip-



Motor applications in domestic and dairy water supply at Holstein Dairy.



Steam generator used for sterilizing dairy equipment.

ment of the dairy itself electric but the home of the owner is electrical throughout.

The dairy is equipped with a milking machine, refrigerating plant, electric steam boiler and a number of pumps.

The milking machine is electrically driven, using a ¾-hp. motor. The refrigerating equipment consists of an ammonia plant and utilizes a 5-hp. motor for the compressor. A 1-hp. motor is used for circulating the water for cooling purposes and a 1-hp. motor for circulating the bran mixer.

For water supply a 3-hp. motor on the tank house pump is used.

For irrigation uses about the farm a 50-hp. pump is utilized. The sterilization equipment is fed with live steam from an electric steam boiler of 15-kw. capacity. A San Joaquin steam boiler is used. Electric bottle washer and electric milk separator are also employed.

The electrical installation at this dairy was made by the Electric Shop of Santa Maria.

Electricity in Spray Plants.—A progress report written by B. C. Moses and W. P. Duruz in co-operation with T. A. Wood of the California Committee on the Relation of Electricity to Agriculture, entitled "Stationary Spray Plants in California," has recently been issued by the University of California College of Agriculture as its Bulletin No. 406. The use of electric motors in connection with such spray plants is illustrated in a number of ways and recommended in this pamphlet where electricity is available. The results of a number of field tests to determine the mechanical features and characteristics of the systems in use are given. Among the points investigated were voltage of the motor and line drop, power required, power factor, speed of motor and pump, etc.; operating costs and costs of installations are also analyzed.

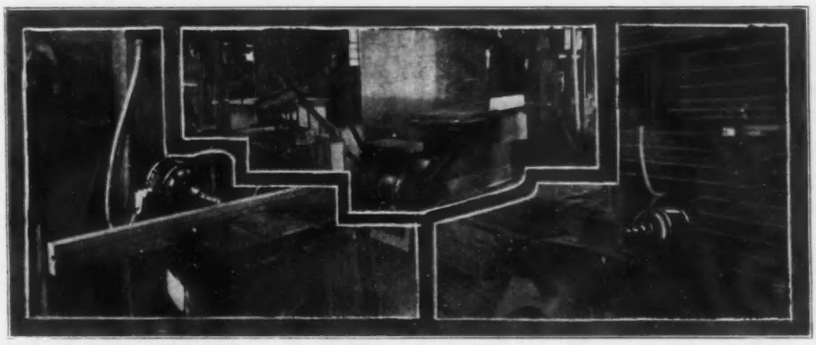
Direct Connection Applications in Woodworking Plant

A novel application of double shaft drive on a motor was installed recently by the California Electric Works of San Diego, Calif., in the woodworking shop of the Dixie Lumber Company, San Diego.

The motor is a Howell and is used to drive both a table saw and a boring machine. The table saw is in use practically all of the time whereas the vertical boring machine is seldom used. The double shaft eliminates the necessity of shifting the belt constantly. After taking the pictures shown the belts were enclosed for safety.

Another interesting application of a similar motor in the same plant is of the boring machine converted from belt driven to direct connection. The boring machine spindle was permanently attached to the shaft of the motor and set in position for horizonital boring.

Similarly a belt-driven joiner was converted to direct connected by means of a coupling. Increased safety and more facile operation results from these chanveovers to direct-connected drive.



Direct-connected motor applications: at left on horizontal boring machine; center, double shaft drive of table saw and vertical boring machine, and at right, direct-connected joiner.

Electrical Estimating for the Contractor—XVIII

Installation Examples Illustrating Methods of Pump Estimating to Provide Adequate Power

By J. R. WILSON*, Quality Electric Company, Los Angeles

There are five methods generally used for computing the quantity of water pumped from a well.

1. Weirs.
2. Venturi water meters.
3. Calibrated nozzles.
4. Pitot tubes.
5. Delivery to a vessel of known capacity.

The most common of these methods is the weir, and there is a variety of ways of making a weir. One of the most widely used in Western irrigation districts is the "Cippoletti Trapezoidal type." Fig. 2 shows the general construction of a weir of this type and while construction with concrete is recommended, the weir can be built of heavy planks made perfectly smooth on the inner side. The water should flow through the weir slowly and without turns for at least 50 ft. Table IX has been computed for a 1-ft. "Cippoletti" weir but may be used for any length of weir by multiplying by the weir length in feet. A 1-ft. weir should not be used for more than 300 gal.

Where it is not desired to build a weir for permanent or periodical measurement of the water a temporary weir may be constructed and installed as follows: Place a board or plank in the stream at some point where a pond will form above. The length of the notch in this board should be from two to four times its depth for small quantities, and larger for larger quantities. The edge of the notch should be beveled toward the intake side. The outfall below the notch should not be less than twice its depth.

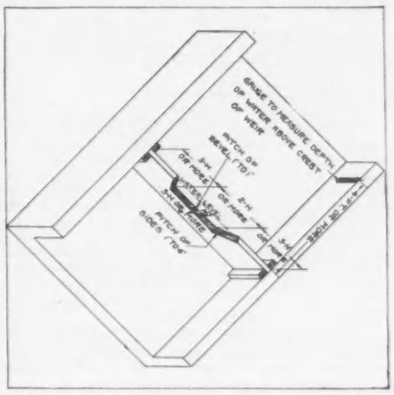


Fig. 2

Obstruct the water until its rises precisely to the bottom of the notch. Then drive a stake in the pond about 8 ft. above the notched board, or dam, with its top precisely level with the bottom of the notch and the depth of water can be measured with a rule after water is flowing free. The distance measured on the rule is the theoretical depth of flow corresponding with the quantities given in the weir table.

The miner's inch is a method of measurement frequently practiced by the various hydraulic companies in California and throughout the mountainous and mining sections of the country, in disposing of water to their customers. The term is more or less indefinite for the reason that the water companies do not all use the same head above the center of the aperture and the inch varies from 1.20 to 1.73 cu.ft. per min. each, and by common practice it has come to be understood generally that a gal. per min. is a basis for figuring a miner's inch.

The duty of water is usually defined as being the amount of water necessary to produce a crop and varies according to the kind of crop and the soil as well as climatic conditions. The unit of measurement for reservoirs is the cubic foot, but this is too small

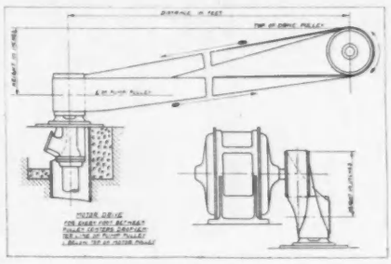


Fig. 3

for convenient use and the acre-ft. (or quantity which will cover an acre 1 ft. deep) is used more generally for large bodies of water. The term acre-ft. is to be preferred as it bears a direct relation to areas to be covered with water. The time-unit is usually one second, and flowing water is measured

* All rights reserved by the author.

by sec.ft., or the number of cu.ft. passing a given point in one second of time.

In the western states, where concrete pipes are used to such a large extent in the conveying of water, the data pertaining to this form of piping will prove of value. Table VIII (see page 421, Dec. 1, 1926,) shows the capacities of concrete pipes (based upon different heads) and the following examples explain the method of using the table:

Example No. 1

"A" wishes to install a pipe line to convey 100 miner's inches of water 1,000 ft. The outlet of the line is 6 ft. lower than the intake. How large a pipe line will he need?

Answer: Find "6" in the first column indicating a 6-ft. "fall" or "head" to 1,000 ft. of pipe: read to the right. You find in the sixth column, and under 12-in. pipe, that the number of miner's inches carried by a 12-in. pipe having this "fall" or "head" is 129.5. Therefore, with a 12-in. pipe "A" can carry, on his grade of 6 ft., the desired 100 in. of water.

Example No. 2

"B" has a pump which discharges 3 cu.ft. of water per second which he wishes to convey 1,000 ft. His land has a "fall" of only 2 ft. per 1,000 ft. in the direction in which he wants to run the water. He installs a 12-in. pipe on the level, connecting it near the pump to a "receiver" or "intake box," into the top of which the water is discharged from the pump. How high must he build the "intake" to deliver the 3 cu.ft. per sec. of water at the dicharge end of the pipe line?

Answer: Take the column headed "12-in. pipe" and read down the column until you find the figures "3.00." By taking the figure directly opposite in the first column you find that the "intake" must be 8 ft. higher than the outlet. As the pipe line has a "fall" of 2 ft., "B" must build his "receiving box" 6 ft. higher than the top of the intake end of the pipe line. If "B" wishes to convey the same stream twice that distance under the same conditions, he must build the "intake box" twice as high. If he wishes to convey the same stream one-half the distance, he may build the "intake box" one-half as high.

On installations where the pumping unit is being driven by some form of power other than an electric motor it is sometimes desired to fit an electric motor to the existing pumping equipment. Where the conditions are such as to render impossible the installation of a belt drive, it becomes necessary to provide some form of flexible drive to cushion both the motor and pump against shock, and to provide for slight misalignment. The usual method is to provide a flexible coupling, consisting of a flange for the motor shaft, and a flange for the pump shaft, with pins threaded into the face of each flange. The two halves of the coupling are connected by means of accurately punched disks of the best grade of oak tanned leather. Great care must be used in the selection of the proper size of coupling for the service it is expected to meet. Fig. 4 shows a typical type of coupling while Table XII gives dimensions and other interesting data.

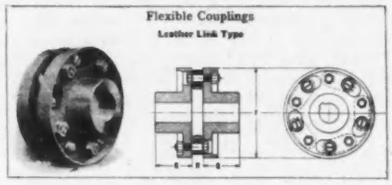


Fig. 4

Directions for Selecting Couplings

1. Divide the hp. of your load by the r.p.m. and multiply by 100.
2. Multiply the above result by the factor for your load (as given in Table XII). This gives the required hp. per 100 r.p.m.
3. Select coupling from Table XII corresponding to this hp. per 100 r.p.m.
4. Check the selected coupling to see that the maximum bore is large enough for the shafts to be connected. If bore is too small select the next coupling which has a suitable bore.

Fig. 3 shows proper method of making a successful layout for a belt drive on a deep-well centrifugal pump.

The installation of pumping equipment has become of such importance in the Western states that a large part of the yearly business of some electrical contractors, located in farming communities, pertains to the installation of wiring, the repair to motors and controlling equipment, the supplying of motors, and the building of pole lines to supply current for pumping plants. The rules of the Industrial Accident Commissions in the most of these states require all wiring in pumping plants to be enclosed in steel conduits and to be effectively and thoroughly grounded and all switches to be of the enclosed, externally operated type. Prices for the electrical installation range from $65 for a simple 7½ hp. installation to as high as $325 for a 100 hp. automatic control pumping layout.

Today the Western states are interlaced with a network of power lines. Electric power at a nominal cost is available to almost every ranch. After the installation has been completed, the cost of operation is usually very low as compared with other forms of power. The electric motor set-up offers a freedom from repairs which is of paramount importance to the average isolated rancher. The final criterion by which all machinery must be judged is its successful operation in the field. As pumping equipment is often operated by men having very little knowledge as to the proper methods of maintenance, great care should be used in selecting the equipment to meet the requirements of each case. Otherwise trouble will be experienced during the total life of the installation.

In making inquiry or in placing an order, the following information must be given:

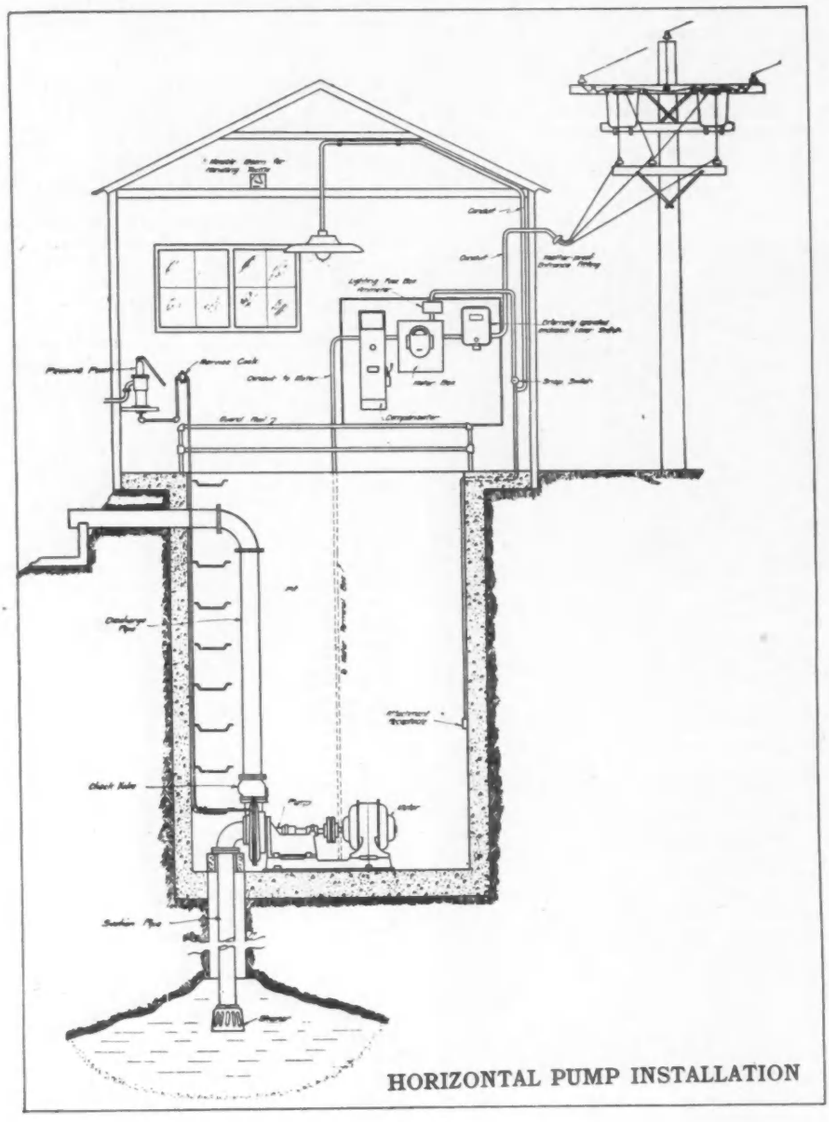
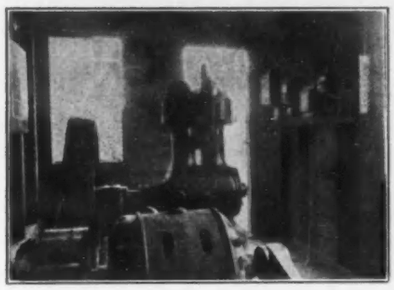


Fig. 1

1. Capacity of pump desired.
2. Total suction lift.
3. Total discharge lift.
4. Length of suction and discharge pipes, together with number of elbows in line.
5. If it is desired to use any particular diameter of suction or discharge pipe, these should be specified.
6. Liquid to be pumped—whether it contains grit or sediment; acids, hot or cold liquids, if hot, state temperature.
7. Kind of power to be used—state voltage, phase and cycles.
8. If price is to include motor, this should be stated.
9. If motor is on hand, state horsepower, pulley diameter, and revolutions per minute.
10. State source of water supply, and if from bored well, give diameter.

Fig. 1 shows a typical installation of a single-suction direct-connected pump. This type of unit can be installed in a pit of 4 x 7 ft. for the small sizes, and 4 x 9 ft. for the larger sizes, but more room should be allowed



At the Salinas Dressed Beef Company a 15-hp., 220-volt Century motor is installed as shown. No compensator is needed on this motor due to its construction. It is used in connection with the compressor used to chill the refrigeration room, 40 x 20 ft. A temperature of 36 deg. F. is maintained by automatic control. In this room there are fifteen 200-watt lamps. In addition to the cooling capacity the refrigerating equipment is capable of making 15 tons of ice daily.

if possible to provide working space around the pump. The suction pipes should be as short as possible and if elbows are necessary they should be of as large a radius as possible. The suction pipe should be only large enough to allow a velocity of not more than 8 ft. per sec.

On small plants this result will be obtained if the suction pipe is at least 2 in. larger than the pump intake, a 5-in. pipe for a 3-in. pump, a 6-in. pipe for a 4-in. pump, etc. The lower end of the suction pipe should be submerged when pumping from 3 to 7 ft. in order to prevent air from being drawn into the pipe, thereby causing the pump to lose its priming.

The writer is indebted to the following firms for the use of much of the data contained in this article:

Layne and Bowler, Pacific Pump Company.

Byron-Jackson, Link-Belt Company, Allis-Chalmers Company and Kimball Pump Company.

Is it Just a Matter of Taking Bids?

There has never been built a house into which "Old Joe Gloom" has not stepped across the threshold. He is the lad who says it with a smile and you've got to take it or hand him his hat.

He'll find a crack in the plaster, a door that turns back the wrong way or electrical inconvenience that tickles his sense of humor.

A great many of the electrical conveniences can be turned easily into a running fire of praise by the new home owner if the electrical contractor is a little more interested than in merely getting the wiring bid. It is a simple matter to find out what the home builder wants. Sometimes an introduction to the owner from the architect is possible. Then follows a talk with the plans in hand to find out what furnishings are going into each room and to settle on the best location for the wall and floor outlets, the wall lighting brackets and the switches.

When it is time for fixtures the wise contractor will show all of the newest of designs even though he may have only samples in his shop. For instance, a shaving light for the bathroom with a convenience outlet in the base in which the lady of the house may plug in an electric curling iron, will become a feature of inspection visits by friends and neighbors of the proud new home owner. An electric light attached to the side of the under shelf of the electric range, a bullseye switchplate for the basement light switch will also be pointed to later with pride.

That could be one way to stop the Joe Glooms and make people ask, "WHO WAS YOUR ELECTRICAL CONTRACTOR?"

Question Box

Arrangements have been made to answer through the columns of the Journal of Electricity such questions on electrical construction and other subjects as are of general interest. Inquiries should be sent to the Editor, Journal of Electricity, 883 Mission Street, San Francisco.

Q. 15. What should be the relative cost between a guaranteed rebuilt motor and a new motor of the same size and specifications?—G.L.P.

A. Most reputable dealers sell guaranteed rebuilt motors at 65 to 70 per cent of the price of new motors.

Q. 17. What is a good average value for carrying capacity of magnet wire for armature and field windings? —A.M.S.

A. A fair average in practice is 500 circ.mil per amp. for armature windings, and about 800 to 900 circ-mil per amp. for field windings.

Q. 19. Can you give a table of costs of excavation and back filling per cubic yard—L.J.R.

A. Cost of excavating and back filling per cubic yard:

Labor per Day	Yards per Day 2	2¼	2½	2¾	3
$1.50	$ .75	$ .666	$ .60	$ .545	$ .50
1.60	.80	.711	.64	.581	.533
1.70	.85	.755	.68	.618	.566
1.75	.875	.777	.70	.636	.583
1.80	.90	.80	.72	.654	.600
1.85	.925	.822	.74	.672	.616
1.90	.95	.844	.76	.69	.633
2.00	1.00	.888	.80	.727	.666
2.25	1.125	1.00	.90	.818	.75
2.50	1.25	1.11	1.00	.909	.833

If higher labor rate is paid, multiply cost according to rate paid. The above data was compiled by The Fiber Conduit Company.

Q. 20. Why is a shunt strip used on the series winding of a dynamo? —M.S.A.

A. To adjust the degree of compounding, by lengthening the shunt strip the series winding is strengthened, and the machine thus can be made to increase its voltage as the load increases.

Q. 21. What size of trolley wire is used on street railways?—C.D.L.

A. No. 0 hard drawn copper for short lines where speeds are not high, and No. 00 or No. 000 for long lines and high speeds.

TABLE XII

Dimensions and Weights

Max. Shaft Diam. Inches	H. P. Per 100 R. P. M.	Max. Rev. Per Min.	Will Transmit Power of Shaft Inches	DIMENSIONS, INCHES F	G	H	Weight Complete
1	¼	4000	⅝	4	1½	¼	8
1⅛	6	3500	¾	5	1⅝	¼	11
1⅜	1.5	3100	1	6	1¾	¼	16
1⅝	2	2700	1⅛	7	2	¼	19
2	3	2300	1⅜	8	2¼	¼	30
2½	3.7	2000	1⅝	9	2½	¼	50
3	7	1800	1⅞	10	3	1⅛	66
3½	9	1400	1⅞	12	3½	1⅛	101
4	19	1100	2⅛	15	4¼	1⅛	171
5	30	900	2⅜	18	5	1⅛	294
5	40	900	3⅛	18	5	2⅛	296
5½	60	820	3⅜	21	5½	2⅛	481
6	100	700	4⅛	24	6	2⅛	572
7	155	550	4⅜	30	8	2⅛	1294
7	230	550	5⅜	30	8	3⅛	1220

Overload Capacity Factors

DESCRIPTION OF DRIVEN UNIT	Gasoline or Oil Engines	Reciprocating Steam Engines and 4-Cylinder Gas Engines	Motors or Steam Turbines
Centrifugal Pumps, Blowers, Uniformly Loaded Generators of even torque	1.5	1.2	1.0
Line Shaft, Med. Shock, heavy torque	2.0	1.7	1.5
Pulp Grinders, Beaters, Fans and Compressors	2.0	1.7	1.5
Triplex Single Acting Pumps	1.5	1.5	1.5
Jaw Crushers, Tube and Ball Mills	2.0	2.0	2.0
Hoists of all descriptions, Deep Well Pumps	2.0	2.0	2.0
Generators not uniformly loaded	2.0	2.0	2.0
Band Saws, Resaws, Stickers and Gang Edgers	2.0	2.0	2.0

The horsepower ratings in table are for smooth and steady service. For unusual conditions the table of overload capacity factors must be used in selecting proper size couplings. For example: A deep well pump is to be connected to a 20 HP. motor running at 900 RPM. Reference to the table below gives for deep well pumps with motors a factor of 2.0; that is, a coupling should be selected having a capacity of 40 HP. at 900 RPM., which would be equivalent to 4.4 HP. at 100 RPM. If couplings are required to drive in both directions special construction is necessary

BETTER MERCHANDISING

"Farthest North" Enjoys Electric Cooking

Dan McGrew Wouldn't Know the Old Town of Juneau As it is Electrified by Alaska Power Company

"Alaska!" The name alone conjures up pictures of gold rushes, Dan McGrew and the lady that was known as Lou, not to mention dog sleds and lots of movie atmosphere. It is the appropriate place in which to set Christmas scenery, at that, although the Alaska of the movies and Robert W. Service poems is not altogether the Alaska of today.

At least Juneau, Alaska, from photographs and information sent down here to "the States" by W. S. Pullen, vice-president and general manager of the Alaska Electric Light & Power Company, may be considered one of the West's most progressive communities. If the captions under the photographs did not mention Alaska, the movie-educated reader would never believe his eyes.

Upon investigation of the true facts it is learned that Alaska is declared to use more electric ranges per capita than any other state or territory of the United States.

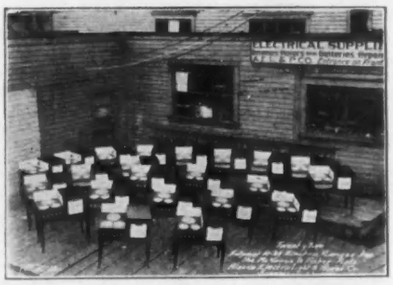
More recent electrifications in Juneau include two new apartment houses completely equipped with electric ranges. The larger of the two, the McKinnon Apartments, has been equipped with 18 Hotpoint, type R95 electric ranges. It is arranged for 12 three-room and 6 two-room apartments, each furnished and modern in every respect, including electric lighting, cooking and emergency heating. The Fisher Apartments is a smaller building and has four apartments containing electric ranges of the same type.

The Alaska Electric Light & Power Company operates a wholesale and retail electrical store in connection with its office, carrying all the appliances from flat irons to violet ray machines,

The new McKinnon Apartments, Juneau, Alaska, completely equipped with electric ranges, lighting and heating.

fixtures, electric boat supplies and motors. The company serves a population of 7,600 people from steam and hydroelectric plants.

Rates for electric energy are low, encouraging great use of electricity throughout the community. The following rate table was furnished by Mr. Pullen with the remark, "Needless to say, electricity for lighting, heating and cooking is very popular in this town and vicinity."



Shipment of 22 electric ranges received at Juneau, Alaska, to be installed in two new electrically equipped apartment houses.

A copy of the revised rate card is as follows:

ELECTRIC SERVICE RATES

Lighting Service—6-5-4 cents per kw-hr.

Heating and Cooking—2 cents summer, 2¾ cents winter per kw-hr.

Motor Service—

*Motors 5 to 25 hp., 3 cents per kw-hr.

Motors over 25 hp., special contract.

Special Flat Rate—Electric water heaters, $2 per kw-month, based on 12 hour daily use, 6 a.m. to 6 p.m.

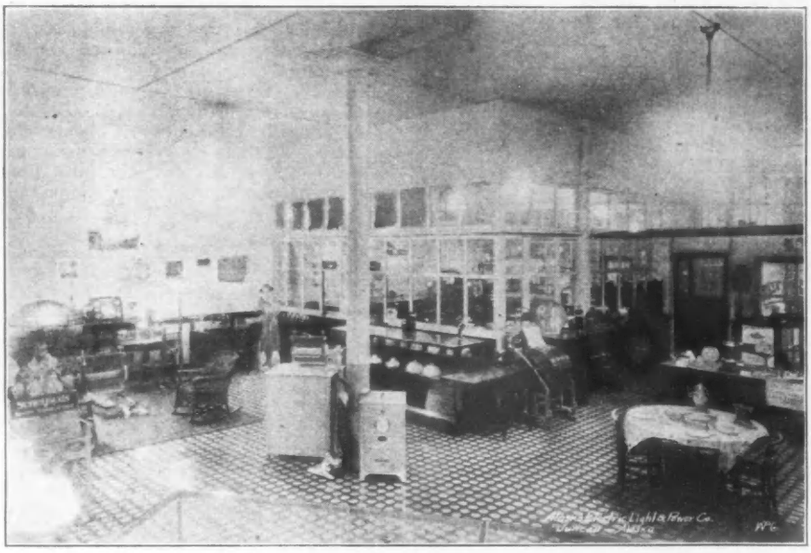
Special Electric Heater Service—May 1 to Nov. 1, $2 per kw.-month.

Minimum monthly charge on all classes of electric service, 75 cents for first 1,000 watts connected load or fraction thereof, and 25 cents for each 1,000 watts in excess of first 1,000 watts connected load.

In all cases where the connected load in all classes of electric service exceeds 20 kw., the A. E. L. & P. Co. reserves the right of making a minimum time contract.

* No change in this rate—Same as past five years.

ALASKA ELECTRIC LIGHT & POWER CO.
Juneau Telephone 6 Alaska



Hardly as one would expect to find it in Alaska is this sales room of the Alaska Electric Light & Power Company, Juneau, Alaska

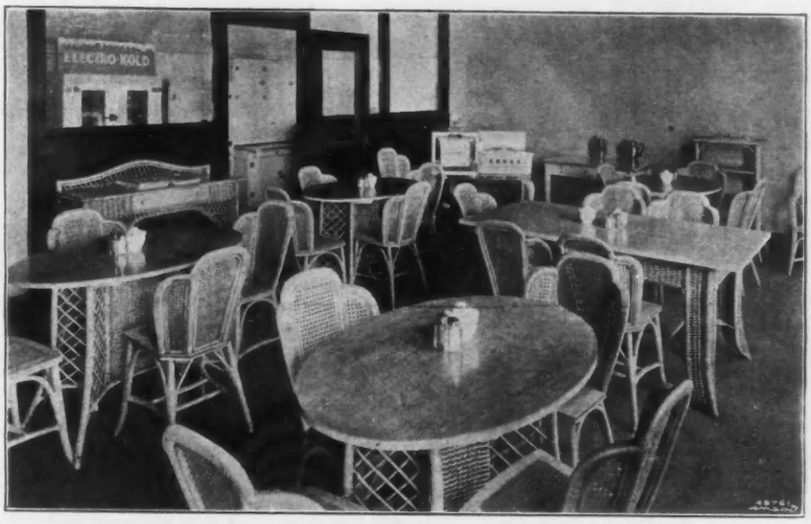
National Merchandising Program Outlined by N.E.L.A.

Again the merchandising committee of the Commercial National Section, National Electric Light Association, has designated appliances upon which national advertising campaigns are to be launched. Dealers in appliances throughout the country are being asked to co-operate with the program in order to reap maximum benefits from the national advertising.

For the first three months of 1927 the program will be as follows:

February—Waffle Irons.
March—Toasters.
April—Percolators.

Advertising and selling helps for these appliances are being prepared both by the merchandising committee and the manufacturers of these appliances.



Tea room of the Northwestern Electric Company, Portland. It is used for range and refrigerator demonstrations conducted weekly as well as by employees bringing their own lunches.

Weekly Range Demonstrations Produce Sales and Good Will

By J. B. BUMAN, Appliance Sales Manager, Northwestern Electric Company, Portland

One of the features of range service rendered by the Northwestern Electric Company, Portland, takes the form of a weekly demonstration and lecture by Mrs. E. Wieser, the company's home economist. These demonstrations are held every Thursday at 2 p.m. in a special room of the building occupied by the company, throughout the months of February, March, April, May and June, and coming thus at a set time on a certain day of each week the dates can be set aside by interested housewives who must plan their days in advance. Besides attracting range customers interested in learning more about electric cookery, the company has attempted to draw to these demonstrations some of its livest range prospects, with the result that about half of the average weekly attendance of from 15 to 40 are women falling in the latter category, among whom many sales have been made.

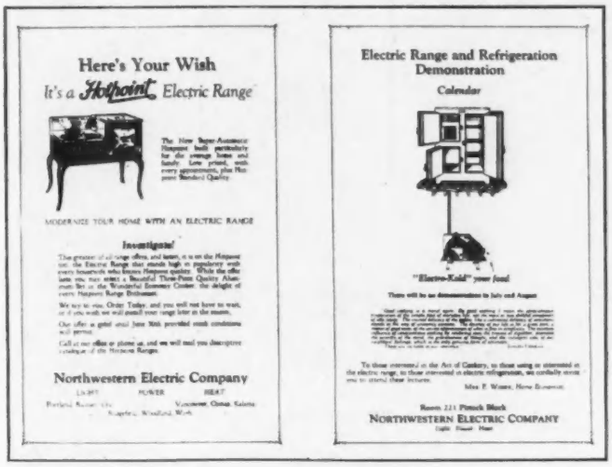
The principal manner of advertising these demonstrations is by means of a calendar program containing announcement of two or three months demonstrations. This program lists the menu to be cooked and served on each Thursday and contains some advertising of certain ranges, refrigerators and ironers handled by the company. The programs are distributed mainly by the salesmen, each sending them to his best prospects or to customers who might be interested. A small supply is left also with dealers to give to their prospects. Thus a selected list only is reached and the booklet is not wasted on persons who might not be in the least concerned.

A different range is featured each month at the demonstrations so that all makes handled by the company are used and explained during the season. One month is given over to apartment house type of ranges and during this month special effort is made to get owners and builders or prospective builders of apartment houses in to the demonstrations. When the company is conducting a campaign on a certain make, the demonstrations during the campaign period are made to tie in with the other advertising done and with the other effort expended.

Because proper storage of food is closely allied to its scientific preparation, Mrs. Wieser spends a part of the time of each demonstration in explaining the value of domestic electric refrigeration. A model of the refrigerator handled by the company is part of the fixed equipment of the tea room, and quite frequently a frozen dessert is on the day's menu, so that an excellent opportunity is afforded to expound the manifold uses of the machine in the home. Many of the women attending have made good use of the the pencil and note book supplied by the company to take down recipes and methods, and this evidence of studious interest has lead the company to recognize that here is a fertile field in which to sow the seeds of promotion of this new kitchen load along with the range. Refrigerator sales among Mrs. Wieser's auditors have amply justified the experiment of demonstrating two appliances at the same time.

The tea room is light and airy with special fan ventilation to remove the odors of cooking. Tea tables, wicker chairs, attractive rugs and draperies contribute to the comfort of the guests, and produce a suitable atmosphere in which to show what a pleasant occupation can be made of cooking electrically. One of the ideas stressed by Mrs. Wieser is that cooking is not drudgery, but rather that it is a fine and delicate art based on exact science. From a sales point of view a psychological advantage is gained by placing the art of cooking on this high plane. The housewife is lead to understand that good cooking is one of the bases of culture, refinement and hospitality in the home, and, in fact, is an important foundation of civilization.

It remains then for the demonstrator to show that the acme of good cooking with a minimum of drudgery can be reached only by the use of the electric range. To help get this idea across, the weekly menus on the program are interlarded with pithy quotations from literature, all having to do with the desirability of being a good cook. These quotations coupled with the attractive make-up of the menus and the delightful setting supplied by the tea room do much to lend an air of studious dignity.


Here's Your Wish
It's a Hotpoint Electric Range
MODERNIZE YOUR HOME WITH AN ELECTRIC RANGE
Investigate!
Northwestern Electric Company
Electric Range and Refrigeration Demonstration
Calendar
"Electro-Kold" your food
There will be no demonstrations in July and August
Room 221 Pittock Block
NORTHWESTERN ELECTRIC COMPANY

Front and back cover of menu and program for demonstrations.

Inside of menu and program, showing range of subjects covered.

Airplane Brings Washer to Open New Factory Shop

Servicing and Sales Facilitated in Arrangements and Selling Plan of New Thor Shop in Oakland

A novel publicity stunt in which a washing machine was brought by airplane from Denver to Oakland served to give an unusual flavor to the opening of the new Thor factory branch at 2431 Broadway, Oakland, recently. The new machine received in this manner from a trainload of washing machines being shipped to the Pacific Coast, was the first to arrive in the San Francisco Bay region. It arrived in time for a sales meeting of the staff of the Oakland factory branch in its new offices.

L. B. Osborn, manager of the new shop and E. C. Sharrow, assistant manager, met the airplane and congratulated the pilot on his trip. Lieutenant William Fillmore, San Leandro's aerial traffic officer, piloted the airplane.

Well Laid Out Shop

The new Thor factory branch has been well designed to accommodate the servicing and sales facilities required for the area served. Over 1,000 sq.ft. of floor space is used in salesroom, storeroom, loading platform, salesmen's quarters, and repair shop. The main floor is devoted to a large window display and a salesroom in which a great number of machines may be exhibited. At the rear are stairs leading to the repair shop and offices and at the back a door to the storeroom and loading platform.

The office is arranged on a mezzanine floor with a view over the sales floor. A salesmen's office is similarly placed. Adjoining it is the very complete repair shop, equipped with a spray hood for applying Duco laquer to the machines, a tool and stock parts room, and ample working quarters.

The storeroom at the rear on the main floor is so arranged that machines may be driven into the building where they may be loaded with washers to be taken out for delivery.

Sales Plan for Two Counties.

Selling over two counties, Alameda and Contra Costa Counties, is supervised and directed from this factory branch. The territory is divided into eight zones. A zone manager is placed in charge of the sales in each zone. There are 35 dealers handling the Thor machines in the territory. Five dealers are assigned to each zone manager, who helps these dealers in making up window displays, advertising plans, demonstrations and in following up leads.

Old machines taken in trade are brought to the Oakland factory branch to be thoroughly reconditioned and then prepared for resale. Thus the dealer is freed from all service and reselling difficulties on turn-in machines. Servicing of new machines is also cared for by the factory branch representatives. All that the dealers are required to do is to procure leads and make sales.

Aside from the dealers the factory branch maintains a force of 12 salesmen who work with the dealers in making sales. Great care is exercised in the selection of salesmen of this work, only the highest type being acceptable. With better men, according to Mr. Osborn, he gets better results with less checking of results being required. Higher grade selling results in each case.

Similar Thor sales methods are employed in other divisions, according to J. W. Ferry, manager, Pacific Coast division of the Electric Household Utilities Corporation, who makes his headquarters in San Francisco.

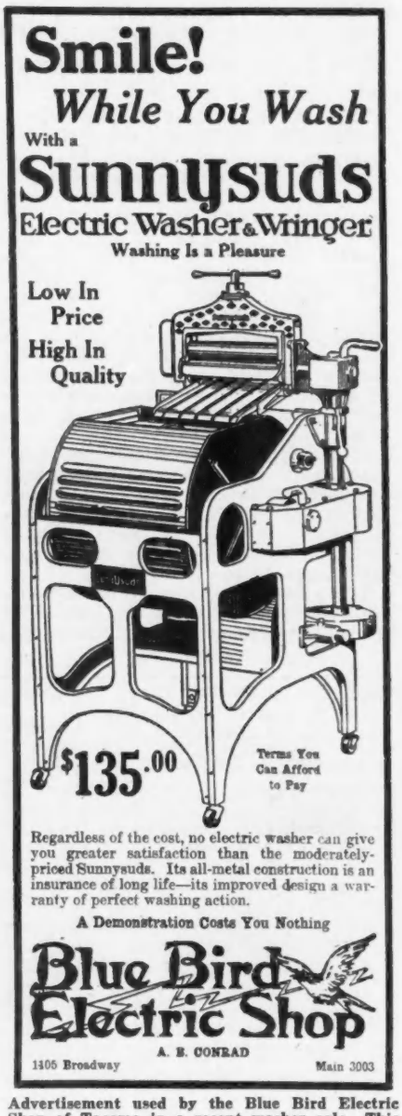
Arriving in Oakland with the new Thor washing machine which was relayed from Denver by airplane.

Copper Association to Push Housewiring Development

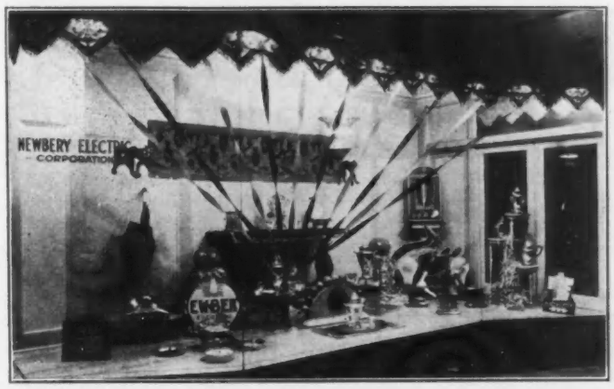
The general inadequacy of electric wiring in the great majority of American homes today represents a situation which is interesting not only to public utilities, electrical manufacturers and contractors, but to the copper industry as well.

The prospect of country-wide improvement in house-wiring installations as a means for increasing the market for copper in the form of wire has attracted the attention of the Copper and Brass Research Association, 25 Broadway, New York City, which is now planning an advertising and publicity campaign addressed to the homeowner, which will stress the importance of modernizing house-wiring installations from the standpoint of convenience and better lighting.

This campaign will be conducted in similar manner to others which the Copper and Brass Research Association has been carrying on in the general building field, as for example the campaigns on brass pipe, copper leaders and gutters, and copper and bronze screen cloth.


Smile!
While You Wash
With a
Sunnysuds
Electric Washer & Wringer
Washing Is a Pleasure
Low In Price
High In Quality
$135.00
Terms You Can Afford to Pay
Regardless of the cost, no electric washer can give you greater satisfaction than the moderately-priced Sunnysuds. Its all-metal construction is an insurance of long life—its improved design a warranty of perfect washing action.
A Demonstration Costs You Nothing
Blue Bird Electric Shop
A. E. CONRAD
1105 Broadway
Main 3003

Advertisement used by the Blue Bird Electric Shop of Tacoma in a recent washer sale. This company makes good use of newspaper advertising, including classified ads.



The Newbery Electric Corporation, Los Angeles, can always be counted upon to produce attractive seasonal window displays, as this Hallowe'en window shows.

Recent window display of products of the Majestic Electric Appliance Company exhibited in the window of the Great Western Power Company, San Francisco.

Above at right: Porcolator advertisement of power companw with dealers co-operating.

DON'T MISS THIS ONE!!
Big Money-Saving
Percolator Event
An Outstanding Value
Featured at Only
$5.95
$1.95 DOWN-
Balance in Two Equal Monthly Payments
A dependable quality made by Landers, Frary & Clark makers of "UNIVERSAL" Electrical Appliances, Fine Cutlery and Hardware
This percolator is equipped with the famous "UNIVERSAL" automatic percolator pump and protective fuse. Its perfect action, efficiency, ruggedness and sanitary construction makes it a value finder worth while.
Guaranteed
This Percolator is Guaranteed to Render Satisfactory Service
IT IS A LARGE 7-CUP SIZE
Sale Starts SATURDAY APRIL 24
The Very Best Quality, Highly Polished Aluminum Electric Percolator Priced at Only $5.95
More people get a bad morning start and more good days are ruined due to a poor cup of breakfast coffee than any other cause. Start the day right. Here's your opportunity to get the right Percolator.
This Percolator was selected after a careful study of many Percolators submitted by a number of the largest appliance manufacturers in the United States—therefore we believe it is the best value obtainable.
It's a Percolator You'll Use Every Day
—It is not a luxury, but an every-day percolator for every-day use. It is a high-grade article prized in reach of everyone.
FOR BETTER FLAVORED COFFEE
—It extracts the full flavor from the ground coffee without any bitterness.
—With ordinary care, and everyday use, it will retain its finish for years.
A Beautiful Design With Paneled Sides
—With the graceful Colonial Paneled sides and the highly polished aluminum surface it presents an appearance fitting for any occasion.
The Midland Counties Public Service Corporation has made it possible for you to purchase these Percolators from the following dealers:
PASO ROBLES ELECTRIC SHOP Paso Robles, Calif.
JOHN R. HURST Atascadero, Calif.
HOLMES ELECTRIC SHOP Pismo Beach, Calif.
THE ELECTRIC SHOP Santa Maria, Calif.
GUARANTEE ELECTRIC SHOP Paso Robles, Calif.
CLINE'S ELECTRIC SHOP San Luis Obispo, Calif.
TURNEY ELECTRIC SHOP Arroyo Grande, Calif.
W. E. HOBBERT Lompoc, Calif.
SAN MIGUEL ELECTRIC SHOP San Miguel, Calif.
VALLEY ELECTRIC CO. San Luis Obispo, Calif.
ERELLE ELECTRIC CO. Santa Maria, Calif.
CREATH BROS. Morro Bay, Calif.

Sales floor of the Winnepeg, Canada, Power Company.

NEWS OF THE INDUSTRY

Edison Company Completes Lower Half of Vincent Line

Marking the completion of the construction work on the southern half of the third 220-kv. transmission line of the Southern California Edison Company, E. R. Davis, manager of construction for the company, on Nov. 21 closed the switch at Magunden substation, six miles east of Bakersfield, that energized the new line and brought it into active use as a part of the great network of electric lines through which the company serves southern and central California. This line, known as the Vincent line, will be built through to connect with the series of hydroelectric plants situated on the Big Creek and San Joaquin Rivers in the northeastern part of Fresno County.

This 95-mile line has required almost one full year to construct, and has cost, with necessary switching facilities, approximately $2,500,000, which includes the cost of building roads, constructing telephone lines and the purchase of the necessary rights-of-way.

In addition to the construction work in connection with the building of the new line, it was necessary for the company to spend approximately $400,000 at Magunden substation to make it ready to handle the additional load which the new line would put upon it.

The Vincent line, on which an exceedingly large-sized cable has been used as a conductor, will have a capacity of slightly more than 150,000 kva. This is more than the combined capacity of the two original 220-kv. lines now in operation between the Big Creek-San Joaquin project and southern California. Work on the northern half of the Vincent line will be pursued diligently, and it will be ready for operation early in 1928, coincident with the completion of the fifth hydroelectric plant on the Big Creek-San Joaquin project.

Industrial Lighting Program for 1926-1927 Announced

The industrial lighting committee of the National Electric Light Association has announced that in order to gain the greatest benefit from the Industrial Lighting activity conducted last year it is proposed that a follow-up campaign be inaugurated for 1926 and 1927.

The committee now is preparing an "Industrial Lighting Fact Book" which, in the words of the announcement, "will contain a fund of information that will be of assistance to the local companies in organizing and conducting industrial lighting campaigns for many years to come." This prospectus will contain complete summation of the experiences gained by central stations in promoting industrial lighting problems last year, together with suggestions of manufacturers of industrial lighting equipment and Mazda lamps. The fact book will give detailed results of community activities, showing exactly how results were best obtained. It will contain also the national advertising plan and the new series of advertisements, a chapter on the organization of local companies, the new plan of the Chicago Electrical Association, illustrations of direct-mail helps available, and the many other means available to promote the sale of industrial lighting equipment.

The proposed industrial lighting advertising campaign, summarized, will accomplish the following: Be a continuance or follow-up of the successful 1925 Industrial Lighting Activity; keep the story of the benefits of industrial lighting before factory executives; back up central stations in their industrial lighting activities; assure the continued increase in the sale of industrial lighting equipment and load.

One thousand dollars will be distributed in prizes covering $500 for the first prize, $300 for the second, and $200 for the third.

Utah Associated Industries to Study Colorado River

Believing that the proper development of the Colorado River can go ahead only after the entire West, and especially the states within the river basin, have reached a unified decision on the matter, the Utah Associated Industries has undertaken a study of the development problems of the river.

In accordance with this plan letters soliciting interest in and support of its successful consummation have been sent to economists, reclamationists, public officials and business men in most of the states of the West by J. G. M. Barnes, president of the Utah Associated Industries.

Red Seal Kitchen Exhibited by Power Company at Fair

At the recent San Diego County Farm Bureau Fair the booth of the San Diego Consolidated Gas & Electric Company represented a model Red Seal kitchen, with a demonstration booth adjoining.

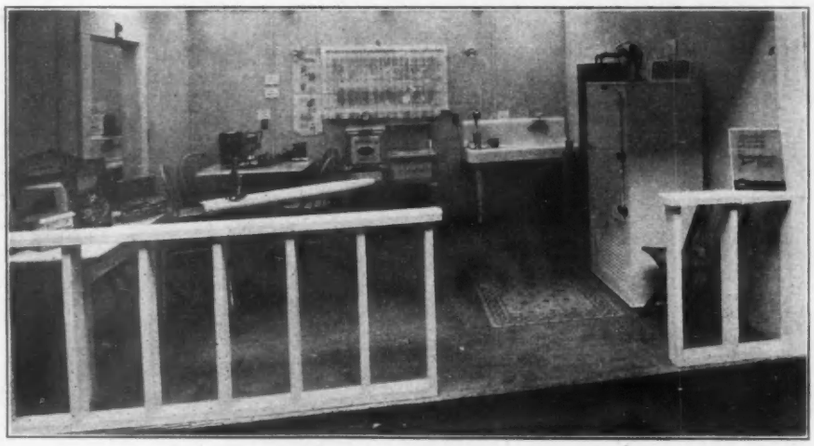
The electrical appliances connected to show the proper operation in the Red Seal kitchen included range, water heater, refrigerator, percolator, waffle iron, iron, toaster, table stove, immersion tumbler heater, fan, mixer, fireless cooker and cigar lighter.

The demonstration kitchen also was equipped with suitable mixing table and serving counter where the visitors might taste of the electrically cooked food. The Model Red Seal Kitchen, in addition to the electrical appliances listed, was equipped with a breakfast nook, ironing board, kitchen sink, and a display table.

In conjunction with this display visitors were requested to sign their names and addresses together with the electrical appliance in which they were most interested, on individually numbered cards. The stub of the card was retained by the visitor and the original deposited in a drawing box. The last night of the fair one card was drawn from this box to designate the winner of an electric percolator donated by the San Diego Consolidated Gas & Electric Company.

At present the San Diego Consolidated Gas & Electric Company is not in the appliance business other than selling electric ranges and water heaters, but these cards furnished a number of prospects for ranges, which when followed up netted a large number of sales.

The chief object of this display was to educate the public along the lines of adequate kitchen wiring, in conjunction with the Red Seal Plan.



Model Red Seal Kitchen exhibited at County Farm Bureau Fair by the San Diego Consolidated Gas & Electric Company

Two Well Known Central Station Men Are Accorded Distinctive Promotion

Recognition of ability in the form of distinctive promotion has been accorded two central-station men well known in the electrical industry in the West—James B. Black, vice-president and general manager of the Great Western Power Company of California, San Francisco, and A. Emory Wishon, vice-president and general manager of the San Joaquin Light & Power Corporation, Fresno, Calif.

Announcement has been made that Mr. Black will join the New York organization of The North American Company as vice-president of the Western Power Corporation shortly after the first of the year. He will continue to maintain his connection with the organizations of the Great Western Power Company of California, San Joaquin Light & Power Corporation and Midland Counties Public Service Corporation, the operating subsidiaries of the Western Power Corporation which comprise the California properties controlled by The North American Company. He will be succeeded by Mr. Wishon, who also will continue to occupy his present post with the San Joaquin corporation.

J. B. BLACK

A. E. WISHON

Since the acquisition of the San Joaquin Light & Power Corporation and the Midland Counties Public Service Corporation in 1924 by the Western Power Corporation, the activities of those companies and the Great Western Power Company of California have been carried on in close co-operation. The construction of the Brighton-Merced 220-kv. steel-tower transmission line and Wilson substation, placed in operation in July of this year, effected the physical interconnection of the companies, and since that date their production and transmission properties have been operated practically as one system. The two properties have had a joint purchasing department for some time, and it is understood that as time goes on further departmental consolidations will take place under the new setup looking toward a single executive control for both properties.

The president of the Western Power Corporation is H. P. Wilson; A. G. Wishon is president of the San Joaquin Light & Power Corporation, and Guy C. Earl is president of the Great Western Power Company of California.

Rapid progress in the electrical industry has characterized the careers of both J. B. Black and A. E. Wishon. Mr. Black, who has the honor of being one of the youngest central-station executives in the country, entered the commercial department of the Great Western Power Company immediately after his graduation from the University of California in 1912. Six years later he was made general sales manager, and in 1922 general manager. In 1924 he was promoted to the vice-presidency, retaining also the position of general manager. Mr. Black has taken an active part in the affairs of the industry, having served as vice-president and president of the Pacific Coast Electrical Association and as a member of its executive committee. He was also formerly a member of the advisory board of the California Electrical Bureau. At the present time he is a member of both the P.C.E.A. Public Policy and Public Relations Sections.

Mr. Wishon, whose new duties make him the operating head of both the Great Western Power Company and the San Joaquin Light & Power Corporation, entered the employ of the latter company in 1910 as assistant general manager in charge of the southern district. Three years later he was made assistant general manager over all properties of the company, and in 1920 became general manager. In 1925 when the Western Power Corporation acquired control of the San Joaquin company Mr. Wishon assumed additional responsibilities as vice-president of the latter company. One of the leaders of the electrical industry in California, he is a past president of the Pacific Coast Electrical Association and past chairman of the customer-ownership committee of the N.E.L.A., and at present is a member of the Public Policy Section of the P.C.E.A. His activities in connection with customer-ownership and customer-relations have made him prominent not only in the industry on the Pacific Coast but nationally. Mr. Wishon was graduated from the Missouri School of Mines and Metallurgy in 1908.

Aerial Survey Finds Water-Power Possibilities in Alaska

In co-operation with the Department of the Interior a Navy Aerial Survey expedition recently was sent to Alaska to obtain information on the possibities of water-power development in that territory. The expedition mapped fifteen islands and the Cleveland peninsula as well as a part of another large island in two days, and its report states that a large lake, locally known as Lake Grace, has been shown by photographic work to hold excellent possibilities for the development of great water power.

In making these aerial surveys two planes working together make two flights daily. In this way it is possible to map in a few days territory that would take years by the old methods of surveying, and the result is a continuous photograph of the land and water.

Seven New Electric Ferry Boats for San Francisco Bay

The increasing trend toward diesel-electric propulsion for ferry boats is shown by the fact that at the present time seven electrically driven ferry boats are being built for service on San Francisco Bay. Two of these are for the Key System Transit Company; three are for the Golden Gate Ferry Company, and two will be in the service of the Southern Pacific Company.

The propelling and auxiliary equipment for the three boats for the Golden Gate company will be furnished by the Westinghouse Electric & Manufacturing Company. The propelling machinery for each boat will consist of two 950-hp., 750-volt, 150-100 r.p.m. single armature, separately excited, shunt-wound; three 270-kw., 250-volt, 265-r.p.m. main generators with differential series, and separately excited shunt fields; three 40-kw., 115-volt, 265-r.p.m. compound wound exciters; one complete switching and control equipment with engine room and double pilot house control stations. The propelling motors, main generators and exciters are of the open, self-ventilated type and will be of exceptionally rugged construction.

Each of the three main generators will be driven by an Ingersoll-Rand, 4-cycle, solid injection diesel engine, an exciter being directly connected to each main generator.

The main switchboard will be located in the engine room and will carry all the instruments, field rheostats, switches, etc., for the propelling equipment, and, in addition, the main controller for the engine-room control station.

The auxiliary motors will be of the Westinghouse enclosed, self-ventilated type, developed especially for marine service and controlled by enclosed marine-type, magnetically operated controllers.

The ships will be heated electrically throughout by the latest enclosed marine type heaters, arranged for low, medium and high heat.

Each of the ferries for the Southern Pacific Company, also of the double-ended type, will have four diesel engines as prime movers. The main propelling equipment, also to be furnished by the Westinghouse company, for each ship will consist of two 1,250-hp., 500 volts per armature, 100-130 r.p.m., shunt wound, separately excited, double-unit, self-ventilated motors; four 275-kw., 250-volt, 230-r.p.m., shunt wound, separately excited main generators; four 40-kw., 125-volt, 230-r.p.m., compound wound exciters, each directly connected to a main generator; one complete switching and control equipment with engine room and double pilot house control stations.

General Electric Company Agency System Held as Legal

Washington Correspondence

In a recent decision handed down by Chief Justice Taft the United States Supreme Court sustained as legal the agency system for distribution of incandescent lamps of the General Electric Company and declared valid and legal the license granted by that company to the Westinghouse Electric & Manufacturing Company. The effect of the decision is to hold legal the system by which the General Electric Company controls the resale price of incandescent lamps.

The federal government brought suit against the General Electric Company, the Westinghouse Electric & Manufacturing Company, and the Westinghouse Lamp Company in the northern district of Ohio, charging a violation of the Sherman Anti-Trust Law. The district court dismissed the bill for want of equity and this decision is affirmed by the supreme court.

In its suit the government charged that the defendant companies were evading a consent decree entered some years ago in a suit against the General Electric Company and other corporations in which restraint of trade had been alleged. It was charged under the later suit that the General Electric Company had what tended to be a monopoly on the sale of incandescent lamps through its agency system and that it used such system to fix resale prices illegally. In the second place, it was charged that it was achieving the same purpose through control of licenses for the manufacture and distribution of such lamps by the other defendants.

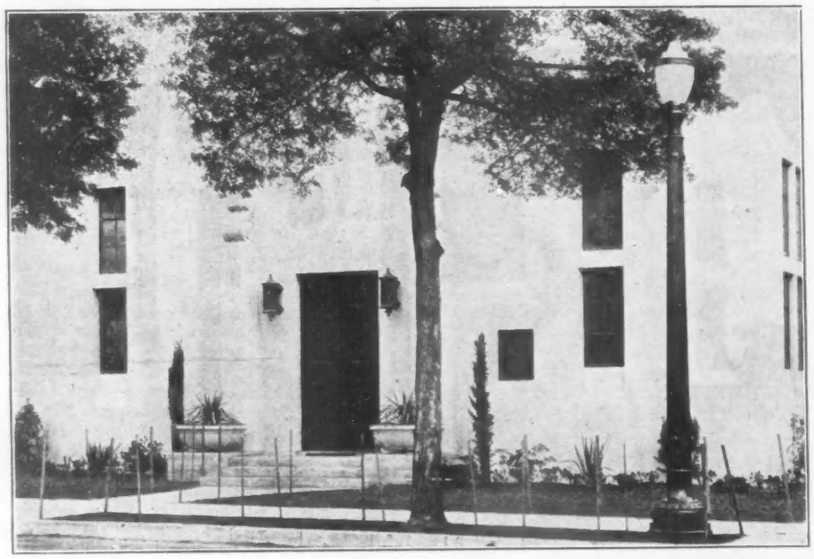
The decision by the supreme court goes into considerable length in reviewing the stipulation of facts before the lower court. It asserts that, although the agents of the General Electric Company distributing incandescent lamps are merchants, there can be no doubt that their relations to the corporation are those of agents of the company. This is established, the opinion states, by the fact that the General Electric Company pays freight on the lamps, carries insurance against them while they are in the stock of its agents, does not collect from the agents until lamps are sold to consumers, etc. The company therefore may dictate prices on its lamps until they are sold by its agents, the court holds.

The relationship between the General Electric Company and the Westinghouse Electric & Manufacturing Company, including the latter's subsidiary, the Westinghouse Lamp Company, are those between the owner of a patent and one licensed by the patentee, the court states. Under patent law, the court points out, it is possible for the owner to make stipulations with the licensee and hence the court finds nothing illegal in the stipulation which the government charged caused the Westinghouse company and its subsidiary to carry on the same general policies in regard to incandescent lamps that had been adopted by the General Electric Company.

Arizona Applies for Permit for Colorado River Project

The board of directors of state institutions for Arizona has applied to the Federal Power Commission for a preliminary permit covering a project on Colorado and San Juan Rivers in Cococino County, Ariz., and San Juan County, Utah. Under the resolution of the commission of Oct. 28, 1926, no consideration will be given this application or any others involving streams in the basin of the Colorado.

The Arizona officials in their application state that they propose to build a dam 693 ft. high at Glenn Canyon site No. 1, which is 4 miles above Lee's Ferry. Such a dam would back up water for 205 miles. The application states that this dam and reservoir are to be an integral part of the Arizona high-line reclamation project. The power is to be used "to supply the power markets of Utah, Colorado, New Mexico and Arizona."



Huntington Park substation of the Southern California Edison Company, which has just been completed, ultimately will have a capacity of 18,000 kw. The bronze tablet alongside the entrance bearing the names of the substation and the company is the only identifying mark. The cost was approximately $150,000.

Final Returns Show 4 to 1 Vote Against Housewives Bill

Final returns on the Oregon Water and Power Board Development measure, the so-called Housewives' Bill, as announced officially show that the proposed measure was defeated on Nov. 2 in every county in the state. The vote against it ranged in ratio from 8.2 to 1 in Jackson County to 2.4 to 1 in Columbia County, the average being 4.2 to 1. The returns by counties are given below:

County	Yes	No.	Total	Ratio Against
Jackson	729	5,998	6,727	8.2 to 1
Grant	140	1,126	1,266	8 to 1
Linn	747	5,556	6,303	7.4 to 1
Marion	1,482	10,538	12,020	7.2 to 1
Benton	429	3,027	3,456	7 to 1
Wallowa	200	1,350	1,550	6.75 to 1
Union	514	3,409	3,923	6.6 to 1
Lane	1,238	7,716	8,954	6.3 to 1
Baker	602	3,701	4,303	6.1 to 1
Sherman	103	597	700	5.8 to 1
Coos	765	4,333	5,098	5.65 to 1
Douglas	780	4,294	5,074	5.5 to 1
Polk	537	2,969	3,506	5.5 to 1
Lake	142	771	913	5.4 to 1
Gilliam	124	672	796	5.3 to 1
Josephine	342	1,807	2,149	5.25 to 1
Curry	100	464	564	4.65 to 1
Yamhill	849	3,904	4,753	4.6 to 1
Wheeler	104	457	561	4.4 to 1
Malheur	282	1,245	1,527	4.4 to 1
Tillamook	479	2,276	2,755	4.25 to 1
Deschutes	500	2,118	2,618	4.2 to 1
Umatilla	863	3,531	4,394	4.1 to 1
Crook	153	611	764	4 to 1
Klamath	785	2,714	3,499	3.45 to 1
Lincoln	416	1,434	1,850	3.45 to 1
Multnomah	15,028	51,134	66,162	3.4 to 1
Clackamas	2,081	6,872	8,953	3.3 to 1
Jefferson	112	364	476	3.25 to 1
Harney	211	656	867	3.1 to 1
Washington	1,292	4,036	5,328	3.1 to 1
Morrow	243	722	965	3 to 1
Hood River	384	1,139	1,523	2.95 to 1
Clatsop	1,035	2,757	3,792	2.7 to 1
Wasco	825	2,100	2,925	2.55 to 1
Columbia	697	1,694	2,391	2.4 to 1
Totals	35,313	148,092	183,485	4.2 to 1

Experimental Dam Tested by Flood Due to Heavy Rain

Early seasonal rains in the high Sierra of California covering the watershed of Stevenson Creek across which Engineering Foundation's experimental arch dam now stands subjected the dam to a test which had not been on the original schedule.

Because of the unusual volume of this precipitation great quantities of water were liberated from the Shaver Reservoir above Stevenson Creek, in the estimated amount of 1,500 sec.-ft., and this water was augmented by the water from the drainage area between Shaver Reservoir and the experimental dam. Although the under-sluice at the dam had been left open, debris picked up by the unusual amount of water in the stream caused the under-sluice to become clogged and the water passed over the crest of the dam at a depth which was estimated to be about three feet. This flow continued for a number of hours. Practically all the scaffold on the lower side of the dam was demolished and all wires leading from the telemeters on that face of the dam were torn loose. Water was still passing over the dam to a depth of a few inches on Dec. 2, but such examination as was possible indicated that there had been no damage to the structure itself.

It will be recalled that the dam is 60 ft. in height, 7½ ft. thick at the base, 2 ft. thick at 30 ft. above the base and of constant thickness of 2 ft. between 30 ft. and 60 ft. of height. Length of the crest is 140 ft. and the upstream face is vertical with a constant radius of 100 ft. There is no steel reinforcement.

Lighting Is Important Factor in Staging of "The Miracle"

Of interest to the electrical industry is the use of lighting to achieve dramatic effects in "The Miracle," declared to be one of the most spectacular and elaborate stage productions on record. This pageant drama, staged by Max Reinhardt and produced in America under the direction of Morris Gest, is to be presented at the San Francisco Civic Auditorium and again in Los Angeles. The San Francisco production is set for Dec. 27, and the auditorium is to undergo elaborate changes in order that the drama may be presented to the best advantage.

The spectacle is entirely in pantomime, there being no dialogue to carry the story. Lighting, therefore, is used as one of the chief factors in the spectacle to convey the sense of the action at all times.

Electrical control of all effects has been elaborately worked out. The chief electrician directing these effects will be stationed in the balcony of the auditorium and will give directions by means of telephone to the electricians stationed in various parts of the stage.

By ingenious means lighting is used to change the scene completely from cathedral to forest. Numerous motor applications to provide for the various effects called for also make the production one seldom equaled in the use of mechanical equipment. Four electric motors totaling 80 hp. control the mechanical operation of the scenic equipment; 22½ miles of cable of various sizes are required for the lighting; the setting is illuminated from lamps concealed in columns and between the banners on the balcony rails. Twelve portable switchboards are used to control the 440 high-powered spot lamps and 1,500 star lamps. Five hundred and ten electric candles on individual switches also are used, and 120 stereopticon lamps are available individually, collectively or in units.

Glines Canyon Notable Automatic Hydroelectric Station

What is claimed to be the largest single-unit automatic hydroelectric generating station now is under construction by Thebo, Starr & Anderton of San Francisco for the Northwestern Power & Light Company, Port Angeles, Wash. This station, known as the Glines Canyon power house, is being erected on the Elwha River 11 miles from Port Angeles to furnish power for the Washington Pulp & Paper Company's plant in that city. The plant is expected to be put in operation early in 1927.

Generating equipment will consist of a 17,500-hp., vertical-shaft Francis turbine furnished by the Pelton Water Wheel Company, driving a 13,333-kva., a.c., 6,600-volt, 3-phase, 60-cycle, 225-r.p.m., vertical generator with directly connected exciter. Generator, three 4,500-kva. outdoor-type transformers, necessary switching and all other electrical equipment will be supplied by the General Electric Company. Through selector supervisory equipment the operator at the Elwha station 7 miles distant will give starting and stopping indications and supervise the running of the automatic plant.

Salt River Valley Water Users Contract to Sell Power

A contract for the sale of hydroelectric power to the extent of about $250.000 a year has been made between the Salt River Valley Water Users' Association and the Nevada Consolidated Mining Company, of which the Ray Consolidated Copper Company now is a part. Connection with the present lines of the association will be made by building from Superior to Ray, a distance of about fifteen miles.

The Ray company has started upon construction of a service line from its power plant at Hayden, up the Gila River Canyon, about 30 miles, to the site of the new Indian Bureau Coolidge Dam near San Carlos.

Early in 1927 the Salt River Valley Water Users' Association will have a large surplus of electric current available from the Horse Mesa Dam, now under construction. At the present time it has a market to the extent of about $750,000 a year from the electrolytic works of the Inspiration Consolidated Copper Company at Miami, Ariz.

N.E.L.A. Announces Enlargement of Engineering Staff

Two young engineers with from three to five years operating experience are desired by the National Electric Light Association to fill positions created by the proposed expansion of its engineering department activities. One of the new positions is designed for research into overhead systems problems and the other for inductive co-ordination research.

This presents an opportunity for two enterprising young engineers who may be interested in the work involved. Both positions include office and field duties and incident traveling. Applications should be sent directly to Major H. S. Bennion, director of engineering, N.E.L.A., 37 West 39th Street, New York City.

Northwest Utility Announces Contest for Employees

As a result of the interest shown in the recent suggestion contest among employees of the Puget Sound Power & Light Company, Seattle, the company has decided again to offer substantial prizes in a similar contest. The new contest, which commenced Oct. 1 and will close May 1, 1927, offers $1,000 in cash to the best five "suggestions or plans submitted to cover subjects which are of such a practical nature that adoption by the company would probably result in an increase of gross earnings or a decrease of operating expenses, or a well defined company policy which will clearly indicate increased efficiency throughout the organization or better relations with the public in the territory served." The prize money is divided as follows: $400, $250, $200, $100 and $50.

In the former contest announced in July, 1925, and ending in June of this year, three prizes, $500, $300 and $200, were offered. After careful consideration of many excellent suggestions, awards were made to C. S. Reynolds, supervisor of public relations, southwestern district, Tacoma, first, for a suggestion for a "Simplification of Rural Extension Policy"; A. C. Riggs, superintendent of light and power, northern district, Bellingham, Wash., second, for a suggested system of "Cost Analysis by the Use of Charts;" and A. R. Haines, central district, Seattle, third, for "A Complete Analysis of Hydroelectric Station Operation." In addition, honorable mention was given to suggestions by O. O. Rutledge, southwestern district, and L. J. Pierce, central district; and special mention to those by Mrs. M. L. Redward, northeastern district, Everett, Wash., F. E. DeSilvia, central district, L. Robertson, central district, M. T. Crawford, central district, and J. J. Mersom, southwestern district.

Electric locomotive soon to be put in service by the Great Northern Railroad in the Cascade Mountain section in Washington.

Electric Locomotive for Service in Cascade Mountains

The electric locomotive shown in the accompanying illustration soon will be placed in operation by the Great Northern Railroad in the Cascade Mountain section in Washington. This engine, said to be the world's largest motor-generator locomotive, is capable of hauling trains consisting of as many as 200 cars.

Having transformers and motor-generators included as part of its electric equipment, the locomotive utilizes high-votage alternating current on the trolley to drive direct-current traction motors, thus providing the highest efficiency from the standpoint of electric transmission and motor drive. It can exert 7,000 hp. under maximum conditions and has a continuous rating of more than 3,500 hp. The locomotive was built by the Westinghouse Electric & Manufacturing Company.

Huntington Beach Substation to Be Started at Once

Work is to begin immediately on the construction of a new substation for the Huntington Beach territory of the Southern California Edison Company. This station, which will cost approximately $135,000, is to be located about four miles north of the city of Huntington Beach, at the corner of Wintersburg Avenue and B Street.

The electrical installation will consist of four sections of 60-kv. rack, seven sections of 11-kv. rack, four 2,000 kva. transformers, 60/11 kv. Four 15-kv. lines, two 4-kv. lines, and one street light circuit will be fed from the station.

The building will be of brick and will be 20 x 46 ft. An operator's cottage and a combination garage also are to be built on the site. In keeping with the policy of the company the grounds will be carefully landscaped and everything done to make the installation beautiful as well as useful.

Two Equipment Contracts Let Recently in Seattle

Contract for furnishing motors to be installed in the $250,000 plant under construction in Tacoma by the Osgood Panel & Veneer Company has been awarded to the Seattle branch of the Allis-Chalmers Manufacturing Company. The award includes twelve Timken tapered roller bearing motors ranging from 75 hp. down.

Another contract recently let in Seattle covers equipment for three radio broadcasting stations to be built for the Northwest Radio Service Company in Seattle, Portland and Spokane. It was secured by R. R. Poppleton, Inc., of Seattle, and includes nine 15-kva. transformers, five 5-kw. motor-generators, and a number of circulating pumps.

Two San Francisco Firms Plan Paper Mills in Alaska

Further evidence of the fact that American newspapers are beginning to look to Alaska for their supplies of print paper is shown by the application to the Federal Power Commission by George T. Cameron, publisher of the San Francisco Chronicle, for a preliminary permit covering a power project on Crater and Long Lakes in Alaska. The power is to be used for the operation of a news print paper mill This application is in conflict with one which has been filed by William Randolph Hearst. It reveals that Mr. Cameron plans to erect at the earliest possible date a 200-ton news print mill. Eventually he expects to increase the capacity to 500 tons daily. The application makes no estimate of the amount of power which will be available.

I. and J. D. Zellerbach, also of San Francisco, have applied to the Federal Power Commission for a preliminary permit covering a project on Revillagigedo Island, Alaska. The power is intended for use in the operation of a paper and pulp mill to be established near the head of Thorne Arm. The applicants propose to make an ultimate installation of 86,000 hp.

N.E.L.A. to Co-operate with U.S. Weather Bureau in Survey

The U.S. Weather Bureau has agreed to co-operate with the National Electric Light Association in a meteorological survey to develop more facts with regard to sleet storms, glaze formations and wind pressures and some of their characteristics.

A mass of records is available at the Weather Bureau, but these will have to be supplemented by special observations. The bureau has made available to the association the detailed records of past sleet storms and has agreed to instruct its local offices to take additional observations.

The purpose of the proposed survey is to determine more accurately the factors of safety of existing types of overhead lines so that they may be strengthened if necessary or may be cheapened if it should develop that it can be done without danger.

News Briefs

U. S. Geological Survey Reports on Power Production.—A report by the U. S. Geological Survey on the production of electric power in the United States for the months of July, August and September, shows that the total electric power produced by water power in the country, measured in thousands of kilowatt-hours, was 6,160,270. For the Pacific States the figures given were as follows: July—724,559; August—672,699; September—620,818; or 2,018,076 thousands of kilowatt-hours. For the Mountain states the following figures were reported: July—252,970; August—261,402; September—245,508, or 759,880 thousands of kilowatt-hours.

El Paso Company Receives Special Mention in Coffin Award.—In the awarding of the Coffin Medal for 1926 the El Paso Electric Railway of El Paso, Texas, received special mention and was among the five companies finally considered for the award. The Pennsylvania-Ohio Electric Company, Youngstown, Ohio, was the winner.

Alien Land Law Put in Effect in Japan.—An ordinance making effective the alien land law in Japan was promulgated Nov. 3, to become effective Nov. 10, according to report of the American ambassador at Tokyo. After that date all foreign nationals without exception will enjoy land ownership rights throughout Japan except in certain designated areas "necessary for national defense."

Distributing System of Ostrander, Wash., Taken Over by Puget Sound Company.—The Ostrander Railway & Timber Company's electric distributing system at Ostrander, Wash., has been taken over by the Puget Sound Power & Light Company. The latter plans to rebuild the system and extend service north and south along the Pacific Highway, according to B. M. Atkins, local manager.

Puget Sound Company to Build New Power Cable Across Hood Canal.—The Puget Sound Power & Light Company at Port Angeles, Wash., has been granted franchise to furnish power to existing and future industries on the Olympic peninsula. It plans to spend $60,000 in building a new power cable across Hood Canal and in equipment to reach the plants in that vicinity.

Colorado Voters Defeat Proposed Measure for Control of All Utilities.—At the state election Nov. 2 Colorado voters defeated four to one a proposed amendment vesting a newly created state commission with complete jurisdiction over all utilities except those municipally owned. Colorado is one of the few states where regulation of public utilities is divided between the state commission and a few "home rule" cities.

Northwest Electric Light & Power Association

Accounting Section Committee Chairmen Are Appointed

Committee chairmen appointments in the Accounting Section as confirmed to date are announced by the section chairman, W. L. Fitzpatrick, general auditor, Mountain States Power Company, Tacoma, as follows: purchasing and storeroom committee—E. I. Snyder, assistant auditor, Portland Electric Power Company, Portland; classification of accounts committee—C. F. Kirchaine, staff accountant, Puget Sound Power & Light Company, Seattle; general records committee—R. H. Jones, assistant treasurer, Utah Power & Light Company, Salt Lake; statistical methods committee—D. F. McCurrach, statistician and rate engineer, Northwestern Electric Company, Portland.

Confirmation has not yet been received in the appointment of a chairman for the customers' records committee. No appointment of a fixed capital committee will be made this year.

Engineering Section Personnel Changes Announced

F. J. Rankin, formerly chief engineer of the Idaho Power Company, Boise, has resigned as chairman of the Engineering Section to accept a position in New York. O. L. LeFever, general superintendent of the Northwestern Electric Company, Portland, has accepted appointment to the chairmanship succeeding Mr. Ranklin.

Mr. Le Fever, who was formerly chairman of the hydraulic power committee, has appointed C. P. Dunn, of the Portland Electric Power Company, to succeed him as chairman of that committee.

Dates Announced for Midwinter Meeting of Commercial Section.—The midwinter meeting of the Commercial Section, Northwest Electric Light & Power Association, will be held Feb. 10-11, 1927, at the Multnomah Hotel, Portland.

Large Frequency Changer Ordered by Edison Company.—An order for a synchronous frequency changer set, said to be the largest in the world of the 50 to 60-cycle type, has been ordered by the Southern California Edison Company from the Westinghouse Electric & Manufacturing Company. This set will be rated 30,000 kva. and will operate at 600 r.p.m. It will be equipped with two direct-connected exciters, two Griscom-Russell air coolers, starting auto transformers and regulating equipment. The frequency changer is to be installed in the Rector substation.

Seattle Plans Sale of Municipal Utility Bonds on Installment Basis.—Sale of city utility bonds on the installment plan over the counter is proposed by the city council of Seattle, Wash. It is planned to issue $400,000 of the $3,400,000 Skagit issue for the Diablo dam recently authorized in small denominations and offer it for sale.

Preliminary Index to River Surveys Ready for Distribution by Geological Survey.—The Department of the Interior recently has published a preliminary index to river surveys which have been made by the Geological Survey and other agencies. This report (Water-Supply Paper 558), compiled by B. E. Jones and R. O. Helland, lists by states the rivers that have been surveyed, gives a brief description of the maps, and states where copies may be obtained. The report should be of value to engineers, commissions, and other agencies that are dealing with problems related to the rivers of the United States. A few copies of this report are available for free distribution by the Geological Survey. After this stock is exhausted the paper may be purchased from the Superintendent of Documents, Washington, D. C., for 25 cents a copy.

Charleston, Wash., Tables Ordinance for Municipal Power Plant Purchase.—The city council of Charleston, Wash., has tabled an ordinance calling for the contemplated purchase of a municipal electric power plant, after weeks of effort to come to a decision. When the council was advised that the preliminary figure of $75,000 in bonds carried in the ordinance probably would not be more than half enough to establish a plant, it was decided to table the ordinance. Norwood Brockett, director of public relations of the Puget Sound Power & Light Company, presented figures which showed that the town could not purchase and operate a light plant at lower rates to users and succeed below an annual deficit of $23,000.

Power Unit Taxing Change Proposed in Plumas and Butte Counties, Calif.—A movement designed to put operating properties of power companies back upon county assessment rolls has been placed before the supervisors of Butte County, Calif., by the Plumas County board for approval. According to Plumas County officials, mountain counties where hydroelectric plants have been built are discriminated against under the present mode of taxation. The movement is not designed to collect more taxes from electric utility corporations, Plumas authorities maintain, but it is urged that the method of taxation be changed so that these counties would be compensated for the loss of this taxable property.

P.C.E.A. News

Engineering Section is to Meet in S. F. Jan. 12-14

Members of the Engineering Section of the Pacific Coast Electrical Association are to gather at the Fairmont Hotel in San Francisco for a three-day session Jan. 12-14, 1927. This is the regular midyear meeting of the section.

One of the outstanding features of the session will be the joint meeting with the San Francisco Section of the American Institute of Electrical Engineers. This joint meeting will be held following the close of the business sessions Friday evening, Jan. 14, 1927, at the Ryan Laboratory at Stanford University. To facilitate matters the joint group will congregate at the hotel and go to Palo Alto via automobile where dinner is to be served at the laboratory. A special demonstration of the 2,000-kv. equipment is being arranged by Dr. Harris J. Ryan.

Commercial National Section to Meet.—The second group meeting of the Commercial National Section, N.E.L.A., will be held at the Edgewater Beach Hotel, Chicago, March 9-11, 1927.

A.I.E.E. News

San Francisco Section will meet in joint session with the P.C.E.A. Engineering Section at the Ryan Laboratory, Stanford University, Friday, Jan. 14, 1927. This promises to be the most interesting meeting of the year. Automobiles are to leave the Fairmont Hotel, San Francisco, in time to arrive at Stanford by 6 p.m. The usual dinner will be held prior to the meeting, but it will be served at the laboratory. Section members should return automobile registration cards to the transportation committee immediately upon receipt.

San Francisco Section meets Dec. 17, 1926. Dinner is planned to precede the meeting. E. M. Calderwood and J. E. Heller of the engineering department, The Pacific Telephone & Telegraph Company, will present an interesting discussion of the design and construction of a long-distance toll cable installation between the San Francisco Bay region and Sacramento.

Student Branches.—During the past year the student branches committee has favorably recommended to the board of directors of the institute the applications of the University of Wyoming, Laramie, and the University of Santa Clara, Santa Clara, Calif., petitioning the establishment of student branches.

Book Reviews

ELECTRIC TRANSIENTS

By Carl Edward Magnusson, M.S., Ph.D., E.E., author of Alternating Currents, professor of electrical engineering and director of Engineering Experiment Station, University of Washington; Fellow, American Institute of Electrical Engineers, and American Physical Society; Member American Society of Civil Engineers and American Mathematical Society. Second edition, 1926; 237 pages, 216 illustrations; 6 x 9 in., cloth bound. McGraw-Hill Book Co., Inc., New York City. $3.

This second edition of this book is essentially a new book. Each chapter has been revised and brought fully up to date. One new chapter has been added. The author has given the introductory course in electric transients, as outlined in this book, to electrical engineering seniors in the University of Washington for the past 16 years. Thus the use of the material covered for text purposes has been well established.

In the opinion of the author, it is vitally essential that engineering students gain an insight into and an understanding of the basic fundamentals of engineering. Also, in his opinion, there is no question of the far-reaching importance of transient electrical phenomena in all branches of electrical engineering. His treatment of the subject of electric transients is built upon this concept and should give students a fair working knowledge of the principles involved. The text is illustrated profusely and over half of the illustrations are reproductions of oscillograms taken in the laboratory of the University of Washington by engineering students. G.R.H.

Hydroelectric Power in Washington, Part II.—A Bibliography of Technical Papers, 1878-1925. By Carl Edward Magnusson, professor of electrical engineering, University of Washington. This 143-page pamphlet is a sequel to Part I, published in 1924 as Bulletin No. 26. This publication should be valuable as a reference to the technical papers dealing with Washington hydroelectric developments and possibilities. This publication is known as Bulletin No. 36 and may be obtained through the Director of the Engineering Experiment Station, University of Washington, Seattle, Wash. Price 75 cents.

Electrical Measurements and Meter Testing in the Power Station.—By E. F. Lincoln, consulting electrical engineer, in co-operation with the engineering staff of the Weston Electrical Instrument Corporation. This 155-page publication contains engineering and operating suggestions for the standardizing and electrical laboratories of the electrical utility. It has been prepared with the idea of obtaining a manual of service and value to laboratory executives and to laboratory engineers. Various instruments, test methods and equipment are covered in detail. Published by Weston Electrical Equipment Corporation, Newark, N. J. Price 50 cents.

News of the Electragists

Field Secretary of N.F.P.A. to Address Inspectors

W. J. Canada, electrical field secretary of the National Fire Protection Association, has announced that he will attend the next convention of the Northwest Association of the Electrical Inspectors, Jan. 17-18, 1927, at Portland, Ore., and that he will address one of the meetings there.

Frank A. Morrell (left), city electrician, Stockton; and H. F. Yost, Trumbull Electric Manufacturing Company, San Francisco. Mr. Morrell is chairman of the National Electrical Code committee of the California Association of Electrical Inspectors, which receives suggested changes in the Code and presents them to the National Electrical Code committee.

Others speakers are being arranged for at the present time by the program committee for the convention. The entertainment committee has arranged to put on a manufacturers' show in connection with the convention which is to be educational in character. Space is being sold for the show by the committee which is under the direction of Harry Sroufe of Jagger-Sroufe Company, Pittock Block, Portland, Ore. A banquet and special entertainment for the ladies is being planned and members are urged to bring ladies with them to the convention. Leonard Elder is chairman of the program committee and requests assistance from members in getting the program arranged.

Certain articles of the association are under advisement for revision to conform with the California association's constitution. A list of these has been printed and mailed to all the members so that they may vote upon them at the time of the convention. These have to do with enlarging the membership of the association to permit industrial and supporting members and to extend the geographical boundaries of the association's activity.

At the request of Mr. Canada one of the features of the meeting will be a bringing together of the standards committee on Monday night, Jan. 17, at the Multonomah Hotel, Portland, in which the convention is to be held.

Want Ordinances Repealed.—The Rocky Mountain Electrical Co-operative League recently filed a petition with the City Commission of Salt Lake City asking for repeal of all city ordinances respecting the licensing of electricians and installation of fixtures. The League asked for the creation of a city electrical department.

Single-Pole Fusing.—Announcement was made recently by Ralph W. Wiley, chief of the department of electricity, San Francisco, that beginning Jan. 1, 1927, the use of so-called single-pole fusing and switching, provided all the rules of the National Electrical Code and the electrical safety orders of the Industrial Accident Commission are complied with, will be optional in the city of San Francisco.

Hobart Barnes, assistant executive secretary, California Electragists, Southern Division, left for Scarsdale, N. Y., early in December. Mr. Barnes expects to bring back with him his bride, stopping off at Chicago, Detroit, Syracuse and other eastern cities to make a personal and informal investigation of conditions in the electrical contracting field in those localities.

H. H. Walker and **C. J. Geisbush** of the California Electragists, Southern Division, attended a meeting of the state executive committee of the California Electragists in San Francisco on Nov. 18.

Joseph Endert, some years ago proprietor of the **Kern Valley Electric Company,** has gone into partnership with **G. Jason,** and together they will run the business as the **Jason Electric Company,** in Bakersfield, Calif.

Wm. Madsen of the **Janssen Electric Company** of Eureka was a recent visitor to San Francisco, attending the meeting of the San Francisco Electrical Development League.

Frank William Beyer, electrical contractor of Denver, has recently opened a fixture display store at 3452 South Broadway.

Holmes Electric Shop at Pismo Beach has changed its name to **Whitlock Electric Shop,** according to recent advices.

E. P. Snyder has entered the electrical contracting field in Redlands. He was formerly connected with the **Southwest Electric Company** of that city.

L. Stinchfield, contractor-dealer of Martinez, Calif., on Sept. 1 took into partnership **H. Glass.**

Gerald H. Kaffer has constructed what is believed to be the smallest electric light fixture in the world. Mr. Kaffer is a partner in the **Kaffer-Chapman Electric Company,** Denver. This is a replica in miniature of the four-candle type ceiling unit for residences. The model is two and a quarter inches in diameter, and is operated from a toy transformer on 110-volt service. The 6-8 volt flashlight bulbs are connected in multiple. Considerable newspaper and sidewalk publicity has resulted because of the display of the novel unit in Kaffer's place of business.

John Malpiede has been designated city electrician for Denver, Colo., to succeed **Charles Oehmler,** resigned. The appointment became effective Nov. 1. Mr. Malpiede has been connected with the city for the past eight years in the capacity of electrical inspector.

Chas. F. Oehmler, former city electrician of Denver, became associated with **Fred E. Staible, Inc.,** upon his resignation Nov. 1. Mr. Oehmler is a special representative for the Erie Malleable Iron Company, and will cover the states of Colorado, Wyoming, New Mexico and Utah.

Clean company Felix Butte, vice-president of the California Electragists, is with. Harry Barnard snapped him thus in confab with the laundry man.

W. F. Blide, Electragist, proprietor of the **Blide Electric Company,** of Santa Cruz, recently returned from a trip East. Br. Blide is an active merchandiser in Santa Cruz and recently in co-operation with **John Holt** of the **Santa Crux Electric Company** and **Walter Cox** of the **Cox Electric Company** staged a co-operative toaster campaign in that city.

Hobert W. Barnes, assistant secretary of the California Electragists, Southern Division, was in Santa Barbara and Oxnard in the interests of his organization on Nov. 16 and 17.

The Ideal Electric Shop operated by **C. H. Callison** and **D. W. Maty** at 1519 South Pearl Street Denver, has recently joined the Electrical Co-operative League of Colorado.

The Electrical Supply & Construction Company, Denver, prominent Electragists of the city, has changed its name to the **Kaffer-Chapman Electric Company.**

Meetings

California C.R.E.A. to Meet in Fresno Jan. 21

A meeting of the California Committee on the Relation of Electricity to Agriculture will be held in the San Joaquin Light & Power Building, Fresno, Jan. 21, 1927, according to announcement made by Prof. B. D. Moses, of the College of Agriculture, Davis, executive secretary.

Full details of the program are not yet available, but plans as developed at this time include a meeting of the executive committee at 10 a.m. and a general open meeting to begin at 1 p.m. in the convention room of the building, with music for half an hour.

This meeting is to be open not only to farmers but to central-station men, manufacturers of electrical appliances, jobbers, dealers and all others interested. At least three farmers will speak, one on dairy sterilizers, one on electric brooders, and one on electric walnut dehydraters. Each of these talks will be followed by a short discussion of the committee's investigations given by Professor Moses. A prominent representative of the Pacific Hydraulic Engineering Association will give a description of the standard guarantee form which has been adopted by that organization and by the Western Irrigation Engineering Association, and this paper then will be open for discussion from the floor. Dr. E. A. White, the national director of the Committee on the Relation of Electricity to Agriculture, also will be on the program.

A special exhibit of domestic appliances, sterilizers, brooders, motors and similar equipment will be on display in the salesrooms of the Valley Electrical Supply Company in Fresno, and this may be inspected by visitors throughout the day.

Further details of the meeting will appear in a forthcoming issue.

Success of Red Seal Plan Object of Electrical Bureau

Continuing the policy of 1926, every effort of the California Electrical Bureau will be bent toward making the Red Seal Plan a success in 1927. This decision was arrived at at a recent meeting of the bureau's advisory committee, whose members expressed the opinion that the Red Seal Plan was of such vital importance to the welfare of the entire industry that the organization could do no better work than to use every means within its power to bring the plan to successful fruition.

The secretary reported upon the progress of the Red Seal Plan, stating that on Oct. 31 there were in California 630 Red Seal homes and that in all probability there would be between 730 and 800 by the close of the year.

Attention was directed to the fact that the full measure of work done by the bureau does not always show in the figures reported. An instance was cited in San Francisco showing that of 25 tract builders with whom almost constant contact is maintained 14 have Red Seal homes under way at the present time and 6 have pledged themselves to make all of the homes in their tracts Red Seal. These builders have promised a total of 224 Red Seal homes, of which but 20 are in process of construction, with the result that the Red Seal report shows only 20 Red Seal homes whereas in reality as fast as the other 204 are started they automatically will become Red Seal.

The advertising committee reported that a complete advertising program had been prepared for 1927.

Attention was directed to the Red Seal advertising being conducted in newspapers throughout the United States by the Graybar Electric Company, and a motion was carried to the effect that an expression of appreciation for the valuable assistance which this advertising has lent to the Red Seal Plan be extended to that company.

Sacramento Valley Electrical Society Elects Officers

An interesting illustrated talk on the use of the X-Ray and the different fields in which it is being used was delivered by George Mayer, manager of the Victor X-Ray Corporation of San Francisco, at the last regular monthly meeting of The Sacramento Valley Electrical Society.

At this meeting also the following officers were elected: president—J. O. Tobey, division superintendent, Pacific Gas and Electric Company; secretary—C. S. King, Great Western Power Company; treasurer—F. P. Brunner, Pacific Gas and Electric Company; directors, 1926-1928—R. J. Finchley, California Mechanical & Electrical Engineering Company; George C. Foss, electrical contractor; H. E. Brillhart, division manager, Great Western Power Company.

At the meeting of the society on Nov. 10 Lester S. Ready, chief engineer of the California Railroad Commission, who is to assume the presidency of the Key System Transit Company at the first of the year, spoke on "The Relation of Irrigation to Hydroelectric Development."

COMING EVENTS

Pacific Coast Electrical Association—
Engineering Section Meeting
Fairmont Hotel,
San Francisco, Jan. 12-14

Northwest Association of Electrical Inspectors—
Annual Convention—Multnomah Hotel,
Portland, Ore.,
Jan. 17-18, 1927

California Committee on Relation of Electricity to Agriculture—
San Joaquin Light & Power Building,
Fresno, Calif.
Jan. 21, 1927.

Pacific Division, Electrical Supply Jobbers' Association—
Quarterly Meeting—Hotel Del Monte,
Del Monte, Calif.
Jan. 27-29, 1927

Northwest Electric Light and Power Association—
Commercial Section
Multnomah Hotel, Portland, Ore.
Feb. 7-8, 1927.

National Electric Light Association—
Commercial National Section—
Second Group Meeting.
Edgewater Beach Hotel,
March 8-11, 1927.

Electric Heating Association of San Francisco Meets

At the second meeting of the newly formed Electric Heating Association of California held in San Francisco Dec. 1, the report of the nominating committee was handed in and unanimously accepted by the 34 members present. Officers elected were: J. L. Farley, Pacific Gas and Electric Company, president; Arthur Kempston, Apex Electric Sales Company, vice-president; and C. R. Owens, General Electric Company, secretary-treasurer.

The association was formed to fill a long-felt need for a representative body of men who would meet regularly at luncheon to discuss and work out their common problems in selling industrial, commercial and domestic heating. It is the aim of the organization to have a speaker at each meeting who will speak on some phase of electric heating that will be of mutual interest.

Mr. Farley said that it was the desire of the association to have some kind of a nickname by which it would be known to the industry locally, and he was authorized by W. W. Hicks to offer a prize of a portable air heater for the best name submitted. After informal installation of the new officers the meeting was turned over to W. J. Walsh, of the Great Western Power Company, who discussed the application of various rate schedules as they apply to the different classes of electric heating in the Bay region.

The next meeting of the Electric Heating Association is to be held in January.

Contra Costa League Hears Talk on Red Seal Plan

Victor W. Hartley, secretary of the California Electrical Bureau, with headquarters in San Francisco, was the speaker of the evening at the recent meeting of the Contra Costa Electrical Development League held in Concord, Calif. His subject was, "What, Where, How and Why of the Red Seal Plan."

Others who spoke were Earl Alexander of Alexander & Lavenson, San Francisco; Robert Purssia, of the Westinghouse Lamp Company, and president of the Oakland Electric Club; S. V. Walton, sales engineer, Great Western Power Company, Oakland; Clark Baker, of the National Lamp Works, Oakland; A. E. Julian, of the Clark Water Heating Company; J. A. McWilliams, of the California Electrical Bureau; and George Eldridge of the California Electragists.

Educational films were shown by E. S. Bjonerud of the General Electric Company. Several vocal selections were rendered by Pope Stinchfield, dealer at Martinez, accompanied by Clark Baker, Jr., of the Fobes Supply Company.

Oakland Electric Club Hears Interesting Speech.—"The Thermionic Tube" was the subject of an illustrated talk by A. W. Copley, manager of engineering divisions, San Francisco district, Westinghouse Electric & Manufacturing Company, at a recent meeting of the Oakland Electric Club. Madame Ethel Wakefield rendered vocal selections accompanied by Charles H. Gabriel, Jr., at the piano.

Personals

A. G. Mott, transportation engineer for the California Railroad Commission since November, 1923, has been appointed chief engineer of that body, succeeding **Lester S. Ready,** who has resigned to accept the presidency of the Key System Transit Company, Oakland, Calif. Mr. Mott was born in Minnesota in 1888 but removed to California ten years later. He was graduated from Stanford University in electrical engineering in 1908 and after a postgraduate year of study received the degree of electrical engineer. His early professional experience included some work in ship drafting with the Union Iron Works and some work in the mechanical and electrical departments of the United Railroads, both of San Francisco. In 1909 he was employed by the Southern Pacific Company on the work of electrifying its East Bay suburban lines in Oakland. This was followed by several years of work in various operating and engineering departments of that company. In 1921 he was employed by the California Railroad Commission as assistant engineer and two years later was appointed transportation engineer. In connection with his work with the commission Mr. Mott has conducted several important investigations relating to transportation matters, among which were an investigation of service and operating conditions on San Jose railroads, investigation of service and operating conditions on the Key System Transit Company, investigation in the matter of possible consolidation of the local lines of the Pacific Electric Railway Company in Los Angeles with the system of the Los Angeles Railway, an investigation of the steam railway terminal problem in Los Angeles and several investigations relating to auto ferry transportation on San Francisco Bay, the more important being with respect to the Southern Pacific's operations and the proposed operations of the Golden Gate Ferry Company.

A. G. MOTT

H. L. Barker, president, Meadows Manufacturing Company, Bloomington, Ills., who has been making a business trip throughout the Pacific Coast territory, recently spent some time in San Francisco and Los Angeles.

Roy V. Reppy, vice-president and general counsel of the Southern California Edison Company, Los Angeles, scored a hole in one in a recent golf game at the Wilshire Country Club.

William G. Angermann, for the past two years instructor in electrical engineering at Cornell University, has been appointed instructor in electrical engineering at the University of Southern California. He will have charge of the work in electrical engineering courses for juniors. Mr. Angermann has had engineering experience with the Bureau of Power and Light in Los Angeles and the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

Prof. Thomas Eyre, for many years at Purdue University and Case School of Applied Science, and more recently dean of engineering at the University of New Mexico, has been made professor of mechanical engineering at the same university.

Jerome A. Duffy, formerly connected with the legal department of the Great Western Power Company, San Francisco, has opened law offices in the Stndard Oil Building in that city.

W. W. Briggs, vice-president and general manager, Grays Harbor Railway & Light Company, Aberdeen, Wash., visited San Francisco a short time ago. From 1913 to 1918 Mr. Briggs was general sales manager of the Great Western Power Company of that city.

Walter A. Heinrich, formerly chief electrical engineer with the W. N. Matthews Corporation, St. Louis, has joined the staff of the Jas. R. Kearney Corporation of that city as chief engineer.

Reuben B. Sleight, who has been the engineer of the Minnesota Tax Commission since 1922, has accepted a position as assistant to **Hebert Hoover,** Secretary of Commerce. He will do research work on subjects pertaining to the electrical industry. He succeeds **Paul S. Clapp,** who resigned recently to become managing director of the National Electric Light Association.

Mark Smith, of E. T. Cunningham, Inc., of San Francisco, paid a visit to Los Angeles recently.

C. C. Hillis, vice-president, Allied Industries, Inc., San Francisco, spent some time in Los Angeles not long ago.

H. J. Mauger, assistant to the president of the Edison Electric Appliance Company, Chicago, has been elected chairman of the Heating Device Section of the National Association of Electrical Manufacturers.

R. W. Turnbull, Pacific Coast district manager, Edison Electric Appliance Company, whose headquarters are in San Francisco, recently made a trip to Seattle on business.

F. V. Boller, stock sales manager, San Joaquin Light & Power Corporation, Fresno, Calif., is head of the N.E.L.A. educational course which fifty-one employees of that company and the Midland Counties Public Service Corporation have enrolled for.

V. L. Board, general superintendent of the Public Service Company of Colorado, will head the new industrial development committee of the Denver Chamber of Commerce, according to a recent announcement. The purpose of this committees' program for the current year is to bring to completion a plan to create a loan fund for the financing of new industries for Denver.

H. P. Wilson, president of the Western Power Corporation, New York City, holding company of the Great Western Power Company of California and the San Joaquin Light & Power Corporation, a short time ago paid a visit to the Pacific Coast. While in San Francisco Mr. Wilson was the guest of **J. B. Black,** vice-president and general manager of the Great Western company.

Gaskell S. Jacobs, formerly valuation and rate engineer, San Joaquin Light & Power Corporation, Fresno, Calif., has announced his resumption of the general practice of consulting engineering, with offices in the Balfour Building, San Francisco.

Elmer A. Sperry, for many years a prominent figure in the electrical industry, has been awarded the John Fritz gold medal for 1927 for the development of the gyro-compass and the application of the gyroscope to the stabilization of ships and airplanes. Mr. Sperry, who is now president of the Sperry Gyroscope Company of New York, in 1880 founded the Sperry Electric Company of Chicago, which manufactured arc lamps, dynamos, motors and other electric equipment. Three years later he erected on Lake Michigan the highest electric beacon then known, about 350 ft., and equipped it with arc lights to the extent of 40,000 cp. In 1888 he was accorded the distinction of having been the first to produce electrical mining machinery. Soon after his first successes in that field he founded the Sperry Electric Railway Company of Cleveland to manufacture railway cars, and continued that business successfully until 1884 when the General Electric Company purchased the patents. Mr. Sperry first turned his attention to the gyroscope about thirty years ago. He invented the first successful gyrocompass, and in 1910 organized the Sperry Gyroscope Company for the manufacture of the gyro-compass, ship and airplane stabilizers, highest-intensity searchlamp, fire-control apparatus, airplane and navigational and similar equipment. Mr. Sperry was one of the founders of the American Institute of Electrical Engineers and of the American Electrochemical Society and was chairman of the committee that called the first meeting of the National Electric Light Association. He is a member of many other technical and engineering societies and the holder of more than four hundred patents on mechanical and electrical devices.

ELMER A. SPERRY

E. T. Ward is secretary and credit manager of the new Fobes Supply Company of Montana, with stores in both Spokane, Wash., and Butte, Mont.

Ernest Smith has been made sales engineer for the Allis-Chalmers Manufacturing Company in the Oruro, Bolivia, office. This is a branch of the company's district office in Santiago, Chile.

Charles R. Boggs, factory manager of the Simplex Wire & Cable Company, Boston, recently sailed from that city on a two months trip to Europe.

W. P. Swartz, Pacific Coast representative for the Standard Electric Stove Company, with headquarters in Los Angeles, recently made a trip through the Northwest and Alaska.

Terrill T. Taylor, division engineer, Twin Falls division, Idaho Power Company, has resigned to accept a position with the engineering department of the Cement Gun Company, Chicago. **D. H. Tarleton,** formerly of the company's American Falls power station, succeeds Mr. Taylor.

A. G. Wishon, president, San Joaquin Light & Power Corporation, Fresno, Calif., recently celebrated his seventy-sixth birthday. In honor of the event a dinner party was given at Balch Camp.

W. R. Bell, formerly sales manager of the El Paso Electric Company, El Paso, Texas, has been made superintendent of light and power of that company, succeeding **C. F. Terrell,** who has been promoted to the position of general superintendent of light and power for the Tampa Electric Company, Tampa, Fla. Both companies are Stone & Webster properties. Mr. Bell became head of the El Paso sales department about two years ago and during his administration paid particular attention to the merchandising efforts of the company, with especially successful results. He has been identified with Stone & Webster companies for the past twenty years, his first

W. R. BELL

position having been with the Paducah Electric Company, Paducah, Ky., while he was still attending school and working in his vacation periods. The year following his graduation from Rose Polytechnic Institute, Terre Haute, Ind., in electrical engineering in 1912, he was made assistant superintendent of the Baton Rouge Electric Company of Baton Rouge, La., and later became sales manager. In 1920 he joined the organization of the Haverhill Gas Light Company, Haverhill, Mass., as sales manager, remaining there until 1924 when he was transferred to El Paso.

V. G. Shinkle, secretary-treasurer, The Washington Water Power Company, Spokane, recently visited Chicago, St. Louis and Denver.

J. E. E. Royer, assistant general manager, The Washington Water Power Company, Spokane, attended the recent national convention of the American Electric Railway Association at Cleveland.

W. B. Rittenhouse, hydroelectric engineer, Byllesby Engineering & Management Corporation, who has been spending some time at the El Dorado project of the Western States Gas & Electric Company, Stockton, Calif., paid a visit to San Diego not long ago.

Jack Shay is the new sales manager of the Reiman Wholesale Electric Company, Los Angeles.

E. N. Simmons, of the Los Angeles Gas & Electric Corporation, has been named auditor of that company's Employees' Mutual Disability Fund.

Wigginton E. Creed, president, Pacific Gas and Electric Company, San Francisco, played an important part in the western divisional meeting of the United States Chamber of Commerce held in Colorado Springs Dec. 6-7. Mr. Creed was the principal speaker at the session dealing with western industrial development, in which he discussed the relationship of agriculture to industry in the eleven Western states.

Oswald Lewis and **D. C. Perkins,** of the Lewis-Perkins Sales Company, Inc., Salt Lake City, accompanied by **A. E. Wilson** of the same organization, recently paid a visit to San Francisco. During their sojourn they were guests at one of the meetings of the Illuminating Engineering Society.

Carl Pierce, of Hubbard & Company, Pittsburgh, was a recent visitor in San Francisco.

R. E. Fisher, vice-president in charge of public relations and sales, Pacific Gas and Electric Company, San Francisco, spoke on "The Development of Aviation as a Commercial Enterprise" at the closing session of the fourth midyear meeting of the Western Division of the Chamber of Commerce of the United States held recently at Colorado Springs, Colo.

G. M. Eaton, formerly chief mechanical engineer of the Westinghouse Electric & Manufacturing Company, East Pittsburgh, has resigned to join the Molybdenum Corporation of America in a sales engineering capacity. Mr. Eaton entered the employ of the Westinghouse company in 1906 after serving for some years with the Newport News Shipbuilding & Drydock Company in the East and the Union Iron Works in San Francisco.

George Bakewell, Jr., executive manager of the Electrical League of Colorado, Denver, recently spoke before the Colorado Engineering Council in that city on "Artificial Light." Mr. Bakewell also spoke over the General Electric Company's radio station KOA on "Holiday, Home and Commercial Lighting" as a tie-in with the annual Christmas outdoor lighting contest sponsored by the league.

Edwin M. Burgess, retiring vice-president and director of the Mountain States Telephone & Telegraph Company, Denver, was given a testimonial dinner recently in recognition of his record service of forty-five years with the company. Mr. Burgess entered the service as an operator in Pueblo at the age of 18 years.

Ellery W. Stone, for more than two years president of the Federal Telegraph Company, San Francisco, has been made president of Federal-Brandes, Inc., a corporation recently formed through the merging of the Federal Telegraph Company with the Brandes Products Corporation and affiliated Brandes companies in Canada and England. Mr. Stone is well known in the electrical industry and his experience with radio matters covers a wide field. For three years, from 1914 to 1917, he was United States radio inspector for the sixth radio district in San Frncisco. For the next two years he was district communications superintendent of the eleventh naval district with headquarters in San Diego, Calif., and in 1919 became California manager for

ELLERY W. STONE

Kilbourne & Clark Manufacturing Company and its subsidiary, Ship Onwers' Radio Service, Inc., in charge of the Los Angeles and San Francisco offices. From 1920 to 1922 Mr. Stone held the position of general manager of Moorehead Laboratories, and then in the latter year, at the request of officials of the southern Chinese government, he made a survey of the radio situation in China, particularly in the south. In May, 1922, Mr. Stone joined the staff of the Pacific States Electric Company, San Francisco, as sales manager of its radio department, a post he resigned two years later to become president of the Federal Telegraph Company. In his new position as president of Federal-Brandes, Inc., Mr. Stone's headquarters will be in San Francisco.

H. A. Rands, formerly construction engineer for the Portland Electric Power Company, has returned to the United States after spending a year in Nome, Alaska, for the U. S. Smelting, Refining & Mining Company. He has joined the organization of The Washington Water Power Company, Spokane, Wash., in connection with the Lake Chelan hydroelectric development.

R. B. King, general superintendent, **J. D. Orr,** division manager, and **Kinsey Robinson,** division engineer, all of the Idaho Power Company, Boise, recently paid a visit to Baker, Ore., in connection with the purchase of the Cornucopia Mines Company line.

Richard S. Rubincam, local manager, Mine & Smelter Supply Company, Denver, and **Joseph E. Morehead,** assistant director of publicity, Mountain States Telephone & Telegraph Company, of that city, are staff members of Denver's Community Chest.

TRADE NOTES

Edwin L. Wiegand Company, 422 First Avenue, Pittsburgh, has issued Bulletin C-106, "Chromalox Heating Units for Industrial and Commercial Applications." The booklet contains detailed information on Chromalox electric strip heaters, electric space heaters, electric ring units and electric immersion heaters. The back cover is devoted to electric heat engineering data. The company also has issued Bulletin C-108, "For Heating Hard-to-Heat Places," giving concise and tabulated information on its horizontal, portable and vertical types of electric heaters.

General Radio Company, 30 State Street, Cambridge 39, Mass., has issued "General Radio Precision Apparatus," a collection of previously issued bulletins. The book contains Bulletin 925 on quality apparatus and other bulletins on transformers, transmitting and receiving sets, bridges, meters and numerous other radio apparatus.

The National Carbon Company, Inc., New York City, with western branches in San Francisco, Los Angeles, Seattle and Portland, is exhibiting at the Sesquicentennial Exposition at Philadelphia what it claims to be the biggest flashlight in the world. This huge flashlight, measuring 6½ ft. in length and 2½ ft. in diameter, is an exact working reproduction, on a gigantic scale, of one of the popular models manufactured by the company. It is powered, however, from the electric lighting system of the exposition and has a 2,000-watt lamp.

The Standard Underground Cable Company, Seventeenth and Pike Streets, Pittsburgh, recently has developed a new line of high-voltage oil-filled terminals, making use of the barrier type of construction invented by R. W. Atkinson, chief electrical engineer of the company, a few years ago. The fundamental idea underlying the design of these terminals is the use of an oil-filled metallic shield joined to the end of the cable sheath and flaring from the cable diameter in such a way as to relieve the excess stresses occasioned at the end of the sheath, and accomplish a redistribution of stresses favorable to high resistance from breakdown of the terminal either from puncture or flashover. Three sizes of terminals have been developed for use on working voltages of 75 kv., 110 kv. and 132 kv., respectively. The general construction and appearance is the same for all voltages.

The Ohio Brass Company, Mansfield, Ohio, recently started construction work on its new administration building in that city to provide much needed, larger working quarters. The new office building will cost approximately $500,000. It is to be a five-story steel and brick structure with stone trim, 255 x 52 ft., and having reinforced concrete floors. Construction will be fireproof throughout. The general layout and appointments will compare favorably with the finest factory office buildings erected in recent years, according to the company.

George Richards & Company, Inc., 557 West Monroe Street, Chicago, have placed on the market a radio tube tester to be known as the Hemco Radio Tube Tester. Two distinct types are ready for distribution at the present time, one for 201-A tubes UV or UX, and one for UV-199 type tubes. This tube tester operates from the radio set power supply. A double lead wire (brown) is connected one lead to A+, the other to A—, while the single lead wire (maroon) is connected to the 45-volt B.

Here's a lucky picture—just full of horseshoes. John Bray, credit manager of the Graybar Electric Company, San Francisco, has just tossed the equine footgear, which accounts for the exhibition of esthetic dancing which he seems to be giving. And now Al Nicoll, sales manager for the same company, with skillful hand and steady eye, measures the distance to the stake, takes careful aim—and hopes to make a ringer. (Those terms are correct. Joe Thieben, of the Panama Lamp & Commercial Company, expert horseshoe pitcher, says so.) By the way, does anybody know who the pretty little dryad is?

The Mutual Electric & Machine Company, 7610 Jos. Campau Avenue, Detroit, has issued Bulletin 107 which combines under one cover several loose leaf bulletins already published separately. The material deals with "Bull Dog" Fusenters, "Safto Fuse," and other Bull Dog electrical products used in buildings.

Link-Belt Company, 910 South Michigan Avenue, Chicago, has placed on the market its new ball-bearing vibrating screen. The low upkeep expense necessary in the use of this screen and its wide adaptability for the exact and careful screening of an exceedingly large number of materials are among the advantages of this product, according to the company's announcement.

The Willard Storage Battery Company, Cleveland, Ohio, has adopted a comprehensive program of group insurance benefitting over 2,000 of the company's employees, located in more than twenty cities of the United States and Canada. Included in the plan are life insurance, health and non-occupational accident coverage and accidental death and dismemberment protection. The life insurance will reach a total of approximately $3,000,000, while the accidental death and dismemberment insurance will amount to about $1,000,000.

The Esterline-Angus Company, Indianapolis, Ind., has compiled Bulletin 1026, "New Uses for Graphic Meters." The uses cover the recording of the performance of automatic stations, recording hydraulic pressures, Esterline-Angus instruments in radio telegraph stations, and station records in uptown offices.

The New Departure Manufacturing Company, Bristol, Conn., has issued through its engineering department a booklet, "Cutting your Costs, or What New Departure Ball Bearings Mean in Your Motor." It contains detailed figures comparing the cost of operating with non-ball-bearing motors with that of operation with ball-bearing motors and enumerates other points of advantage of New Departure ball bearings.

The Wiremold Company, Hartford, Conn., has announced its new "Slick-Finish" loom, which, it claims, eliminates the cause for complaint when used for rewiring and extension jobs in residences, as there will be no mica dust floating over the premises and getting into rugs, draperies and other furnishings.

Roller-Smith Company, 233 Broadway, New York, has issued Bulletins No. 110 and No. 150, covering respectively its new type HTD and HTA instruments. The HTD instruments in Bulletin No. 110 comprise direct current ammeters, voltmeters and volt-ammeters. The HTA instruments in Bulletin No. 150 comprise alternating current ammeters, voltmeters and single-phase wattmeters. The outstanding features of these new instruments are that they are small enough for the pocket, tool kit or traveling bag; are accurate enough for all ordinary sets, rugged enough to withstand extremely hard service, are light in weight, very compact and of good appearance. Complete detailed information is given in the bulletins.

Roach Appleton Manufacturing Company, 3440 North Kimball Avenue, Chicago, is adding the following new lines to its lists: Steel fish wire, ⅛, 3/16 and ¼ in. wide in both .030 and .060 thickness, each coil packed in a labeled carton; concrete boxes and plates—all sizes; utility boxes and covers—the full line; gang switch boxes and covers—full line, both regular and shallow depth; tandem switch boxes; no-bolt fixture studs; locknuts and bushings; connectors and hickey type fixture studs.

The Laube Electric Company, Rochester, N. Y., has adopted a plan of co-operative group insurance that, in addition to the life protection offered, provides the advantages of a health and non-occupational accident policy carrying liberal weekly benefits. The life insurance alone exceeds $60,000. Included in the program is a visiting nurse service.

Power knows no nightfall

DAY and night the central stations that dot the country continue their never ceasing round of production. Across mountains and valleys, through open fields and crowded city streets, copper highways take up the burden—carrying light and power to millions of homes and thousands of industrial plants.

The responsibility of the wire manufacturer is clear cut—he must build a product that can take its place as one of the strongest links in this great service chain, a responsibility that the Rome Wire Company has always accepted.

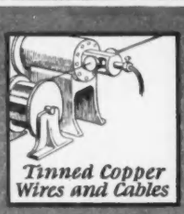
Every Rome wire, from the huge transmission cables to the tiny strands of copper used in the most delicate precision instrument, is produced in Rome Mills, under Rome supervision, from wire bar to finished copper wire. For only in this way can quality be guaranteed, and the industry be assured of uninterrupted service.

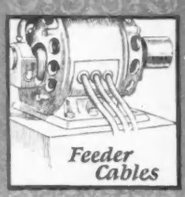
Stranded Double Braid Rubber Covered Wire

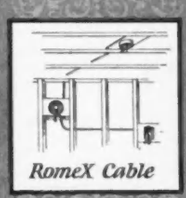
ROME WIRE COMPANY, ROME, N.Y.

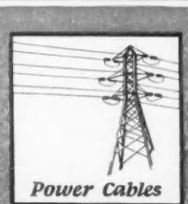
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE









YEARS of investigation and analysis are behind the insulation compounds used with Rome Rubber Covered Wires. The result is an insulation of high dielectric strength, combined with remarkable aging qualities.

In the same way, all Rome Wires and Cables are backed by twenty years of manufacturing experience, and an organization composed of men who have made a life-time study of the construction and use of all types of wire.

All these facilities are under one centralized control, assuring you of ample stocks, quick shipments, and competitive prices.

If you will let us know what wires and cables, shown on this page, you are interested in, we will be glad to send you samples, catalogs, and other information that will be of help to you—while an opportunity to quote on any of your wire requirements will always be welcome.

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Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

New York — 50 Church Street
Boston — 1011 Little Building
Chicago — 14 E. Jackson Blvd.
Detroit — 25 Parsons Street
Cleveland — 1200 W. 9th Street
Los Angeles — J. G. Pomeroy, Inc., 336 Azusa Street
San Francisco — J. G. Pomeroy, Inc., 51 Federal Street

The motor of tomorrow —what will it be?

So dependable are electric motors today that there is no need—and therefore but remote possibility—of radical changes in basic design. In fact, it is safe to say that the advances in motor construction must now be along the line of refinement.

There is *one* definite trend today in motor refinement—the trend toward ball bearings! Ball-bearing motors are not new to industry. Fairbanks-Morse pioneered them thirteen years ago and have consistently advocated them ever since. But the tendency of motor users everywhere to specify dust-proof ball bearings is more marked than ever before.

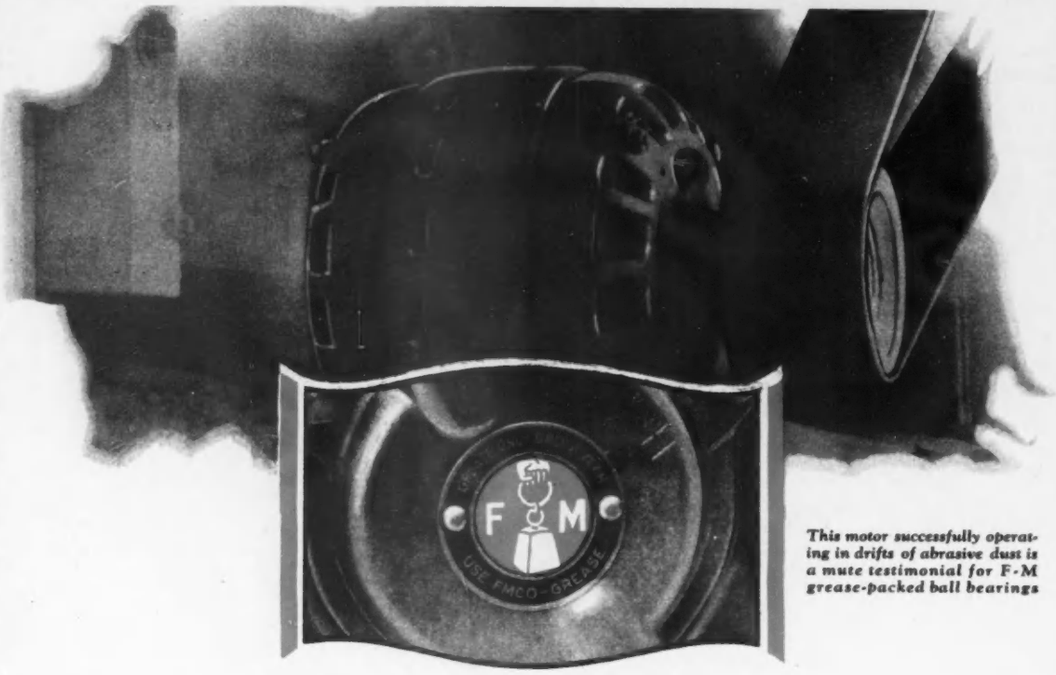
Is it going too far to say that the motor of tomorrow will be a ball-bearing motor?

One motor is better than the Fairbanks-Morse *Sleeve-Bearing Motor.* It is the Fairbanks-Morse *Ball-Bearing Motor!*

FAIRBANKS-MORSE

Pioneer Manufacturers of

ball bearing motors



This motor successfully operating in drifts of abrasive dust is a mute testimonial for F-M grease-packed ball bearings

Our pledge and your guarantee of super-service

Permanently etched in the seal of every F-M Ball-Bearing Motor now manufactured is this assurance that Fairbanks-Morse is squarely behind once-a-year lubrication and the economies that go with it.

And to those who know F-M service this seal also signifies that annual greasing is practically the only attention these motors ever require.

Always a simple operation, the regreasing of Fairbanks-Morse Ball-Bearing Motors has now been still further simplified by grease-tube lubrication—one more step in which Fairbanks-Morse is taking the lead.

Some users attribute this to the liberal rating; others to the many advantages of ball bearings.

But those who have had the greatest experience with F-M Motors know that it is not one but all of these features that have been skillfully balanced and combined to make a super-motor!

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28 branches throughout the United States at your service

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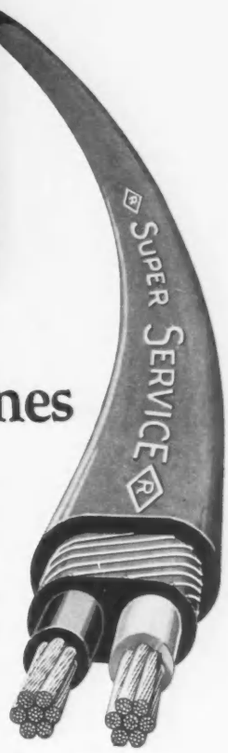
Operation insurance for costly machines

COAL mining is fast becoming a matter of efficient machines—costly electrical machines to which a heavy penalty is attached for every hour, or minute, of idleness.

Mining engineers, who have given thought and study to today's operating problems, are becoming more insistent upon the use of Rome Super Service Cords and Cables, as a guarantee of a continuous flow of current to these machines. Flexible, waterproof, highly resistant to oils and acids, Super Service has proved itself invaluable in the daily grind of countless mines.

It is because of this same dependability that users of industrial power are specifying Rome Wires and Cables throughout their plants for fixed and portable power transmission.

Rome Service, in the form of ample stocks, and competitive prices, is at your disposal, while an opportunity to quote on any of your wire requirements will always be welcome.



Parallel Super Service Mining Machine Cable

ROME WIRE COMPANY, ROME, N.Y.

ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE

Antenna Wire

Weatherproof Wires and Cables

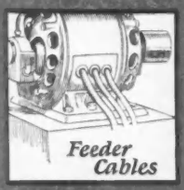
Trolley Wires and Cables

Tinned Copper Wires and Cables

Telephone Wires and Cables

Automobile Wires and Cables

Slow Burning Wires

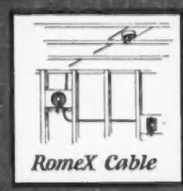

Feeder Cables

Super Service Cords and Cables

Extra Flexible Wires and Cables

Rubber Covered Wires – Code 30% Intermediate

Heater Cords

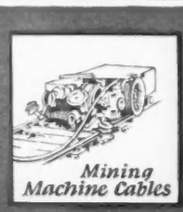

RomeX Cable

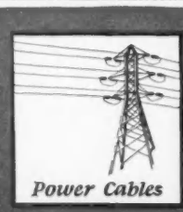
Lamp Cords

Copper Rod and Bare Copper Wire

Lead Sheathed Cables

Magnet Wire


Mining Machine Cables


Power Cables

Radio Wires and Cables

ROME Super Service Cords and Cables were the first rubber sheathed wires ever developed for portable use. Vulcanized in steel molds under tons of pressure, the two outer layers of rubber are molded into a tough protecting jacket which absorbs the shocks that wear out other wires. Long life under the toughest working conditions is assured.

But back of the patented manufacturing process, by which Super Service is made, lies twenty years of manufacturing experience, and twenty acres of manufacturing floor space devoted solely to the manufacture of copper wires and cables of all kinds.

If you will let us know what wires and cables you are interested in, we will be glad to send you samples, catalogs, and other information that will be of help to you.

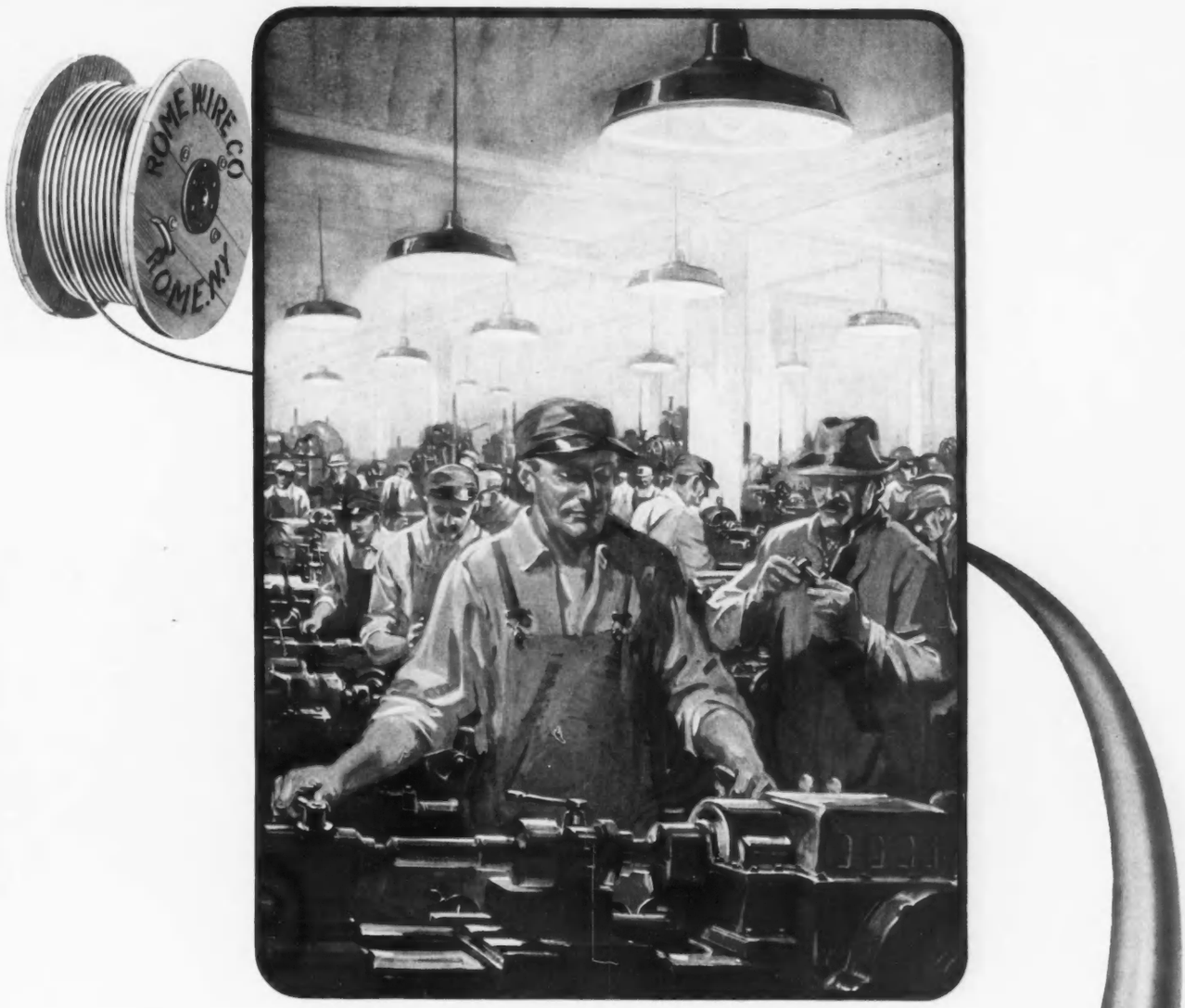
Rome-Wire

ROME WIRE COMPANY

Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

New York—50 Church Street
Boston—1011 Little Building
Chicago—14 E. Jackson Blvd.
Detroit—25 Parsons Street
Cleveland—1200 W. 9th Street
Los Angeles—J. G. Pomeroy, Inc., 336 Azusa Street
San Francisco—J. G. Pomeroy, Inc., 960 Folsom Street



Eliminating the idle hour

USERS of industrial power, who have given thought and study to factory wiring problems, are today insisting upon the installation of Lead Sheathed Cables where power circuits are layed underground, in damp places, or wherever severe conditions exist.

Such specifications are evidence of a desire to install only wires and cables that insure against costly shutdowns—that eliminate the idle hour.

From copper bar—through many insulation processes—into the giant lead presses, and over the inspection mirrors to finished product, Rome Lead Sheathed Cable is constantly passing.

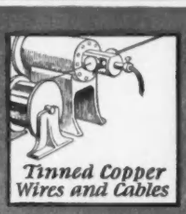
For all Rome Wires and Cables are manufactured from copper wire bar to finished copper wire—in our mills covering 20 acres of manufacturing floor space; under the careful supervision of a trained engineering staff.

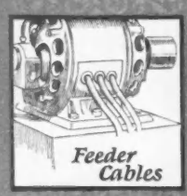
Stranded Rubber Covered Lead Sheathed Cable

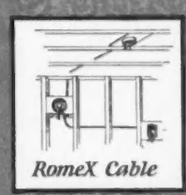
ROME WIRE COMPANY, ROME, N.Y.

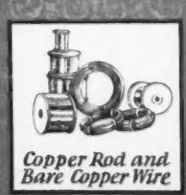
ROME WIRE

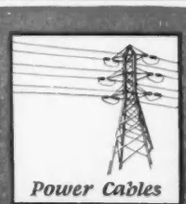
FROM WIRE BAR TO FINISHED COPPER WIRE











THERE is a vast difference in the appearance of the huge Lead Encased Cables, and the fine strands of copper that go to make up magnet wire. Yet, both are manufactured by the Rome Wire Company.

And, if you study the Rome products, shown on this page, you will find, between these two extremes, a variety of types, sizes, and insulations sufficient to satisfy practically any need.

All of these wires and cables are made in Rome Mills, under Rome supervision, from wire bar to finished copper wire.

If you will let us know in what wires and cables you are interested, we will be glad to send you samples, catalogs, and other information that will be of help to you.

Rome Wire

ROME WIRE COMPANY

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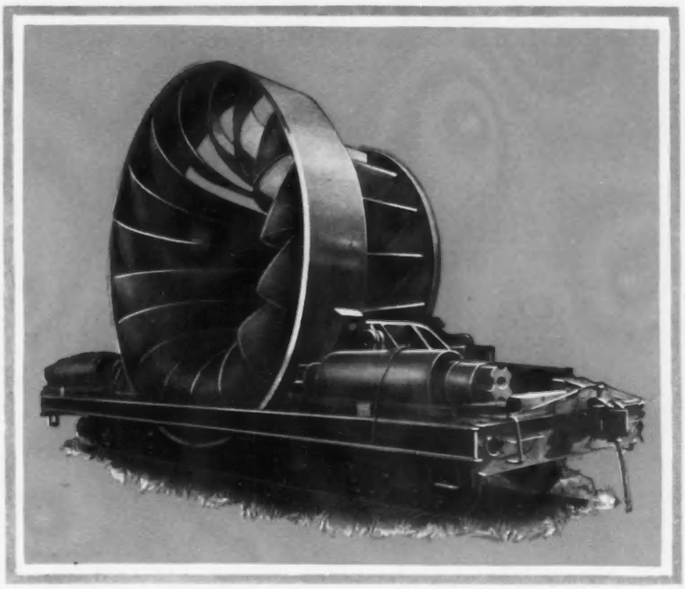


RUNNER FOR ONE OF FOUR 35,000 H. P. TURBINES FOR MUSCLE SHOALS

THE semi-steel runner shown is for one of the four turbines built at Newport News for Muscle Shoals. This runner is a single casting 15 ft. 6 inches in diameter, weighing 138,000 pounds.

The original installation of four turbines was followed by the four Newport News units of 35,000 horsepower each. The total project when completed will carry 10 additional 35,000 horsepower units, or a total of 18 units in all.

In contracting for the building of these four turbines, the Newport News proposal guaranteed the highest operating efficiency; and the performance of the turbines, which are now in use, goes well beyond the specifications.

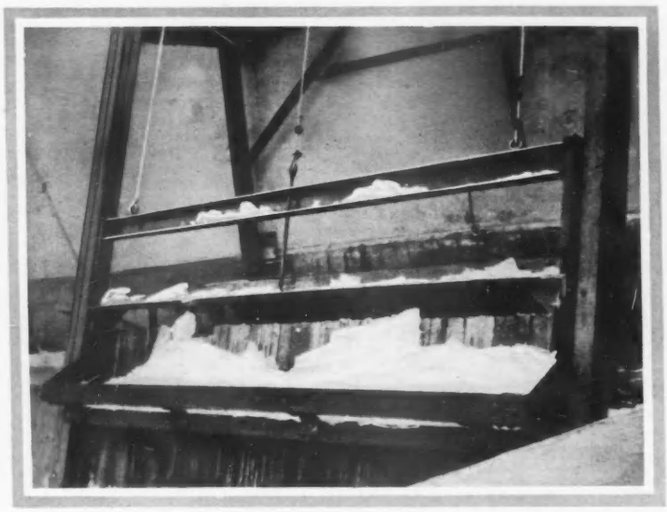
If you will address us on your business letterhead we will be glad to send you an interesting book on hydro-electric equipment: "Beating Swords into Plowshares."

HYDRO-ELECTRIC DIVISION
NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA - CHARLOTTE, N. C. - NEW YORK: 233 BROADWAY
SAN FRANCISCO AND LOS ANGELES: Water Works Supply Company
SEATTLE: Water Works and Power Equipment Company

ECONOMY

DUE to the fact that ship machinery and hydro-electric equipment bear the same mechanical characteristics, it means that your turbines, penstocks, towers, etc. are built with utmost economy in a plant where there is no idle machinery to take its toll of overhead.

The experienced engineering staff of the Hydro-Electric Division has at its command unsurpassed facilities.



NEWPORT NEWS
RACK RAKE
HANDLING ICE

Halve the Work and Help the Plant!

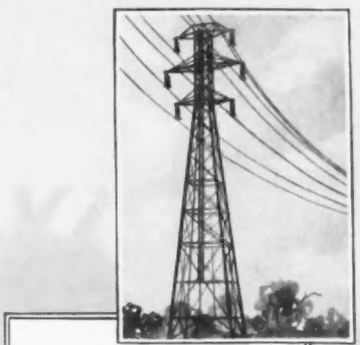
NEWPORT NEWS Mechanical Rack Rake

MANY hydro-electric plants have cut their costs and assured themselves full water at all times by the installation of NEWPORT NEWS Mechanical Rack Rakes.

It is a very simple operation to let down the power-driven rake, and starting at the bottom raise to the surface all of the accumulated debris brought down into the fore-bay and caught on the rack. By the use of the log hooks, you can raise sunken logs of major dimensions.

Plants which heretofore have kept two men busy cleaning racks by the time-honored hand methods, now have reduced the task to a periodic one-man handling of the rack rake controls. This is particularly valuable during spring freshet season, which is the time of most trouble for the majority of plants.

Write for bulletin and complete description of the rack rake and its application to your problems.



PENSTOCK "Y" FOR
ADIRONDACK POWER AND
LIGHT CORPORATION

HYDRO-ELECTRIC DIVISION

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

NEWPORT NEWS, VIRGINIA · CHARLOTTE, N. C. · NEW YORK: 233 BROADWAY

SAN FRANCISCO AND LOS ANGELES: Water Works Supply Company

SEATTLE: Water Works and Power Equipment Company

For cottage or mansion

THE increased demand for better lighting and a greater number of electrical conveniences in the American home, has created widespread interest in wiring details.

How easy then for the electrician to answer the question of safety and durability of a wiring job by the mere explanation—"It's Rome Code."

Contractors have long recognized the in-built quality of Rome Code Wire just as thousands of industrial engineers depend upon other Rome Wires and Cables.

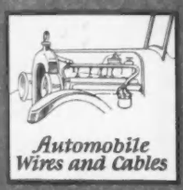
From the huge feeder cables to the smallest portable cords, the great variety of Rome Products are built to meet exacting requirements, in Rome Mills, under Rome supervision and inspection, from wire bar to finished copper wire.

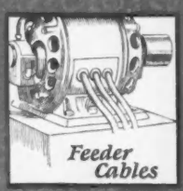
Rome Code Wires

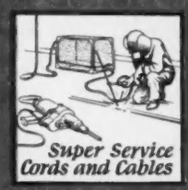
ROME WIRE COMPANY, ROME, N.Y.

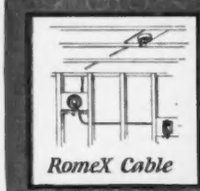
ROME WIRE

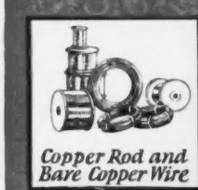
FROM WIRE BAR TO FINISHED COPPER WIRE

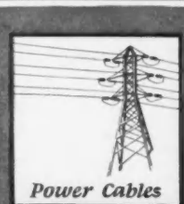












TO many in the electrical industry all code wire is alike. But to the initiated, Rome Code Wire stands out as a better-than-standards product.

The reason for such a reputation is easily understood when you study the organization back of all Rome Wires and Cables.

Twenty years of manufacturing experience—an organization composed of men who have made a life-time study of the construction and use of all types of wire. Twenty acres of manufacturing floor space, all under one centralized control assures you of ample stock, quick shipments and competitive prices.

If you will let us know what wires and cables, shown on this page, you are interested in, we will be glad to send you samples, catalogs, and other information that will be of help to you—while an opportunity to quote on any of your wire requirements will always be welcome.

Rome-Wire

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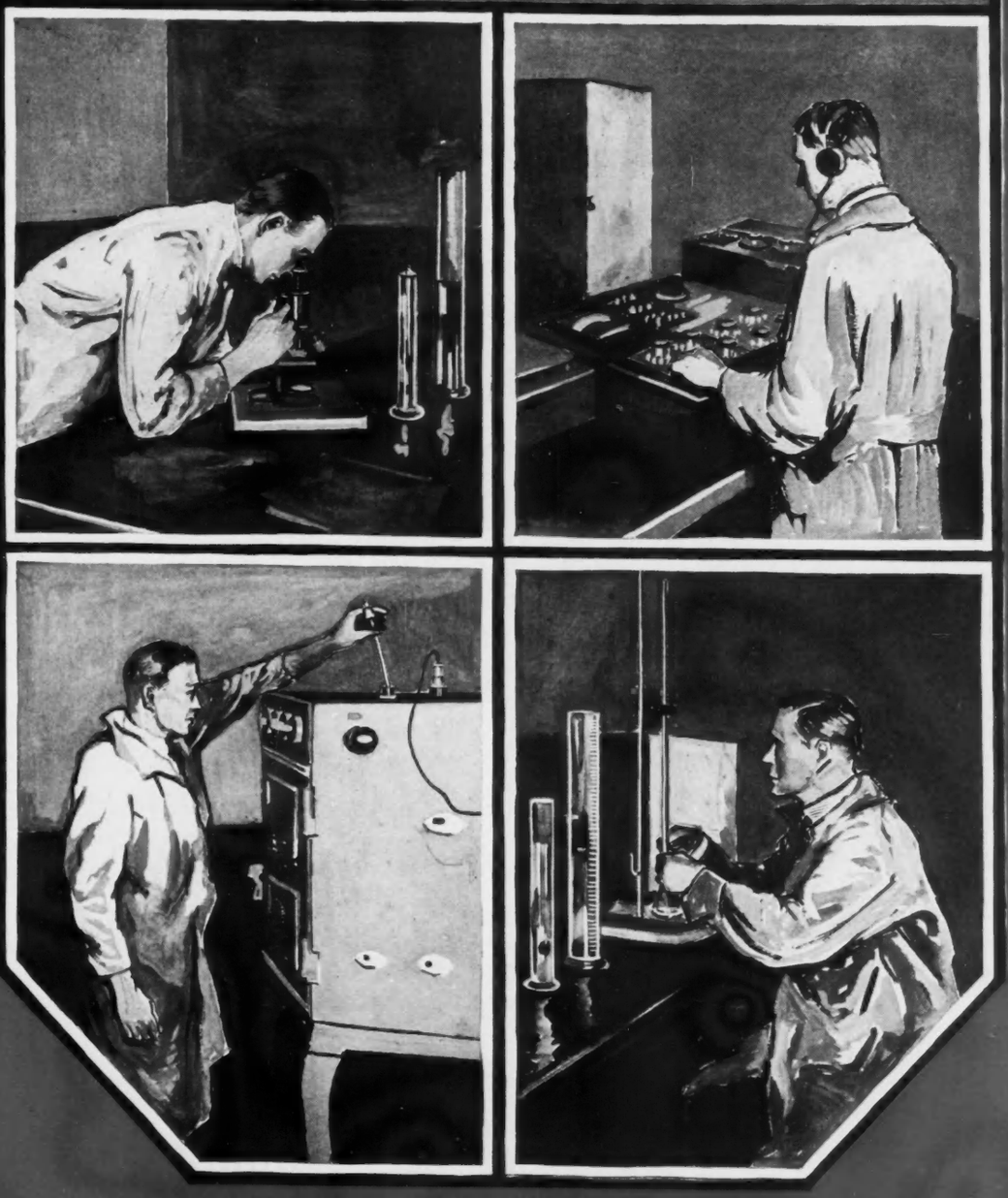
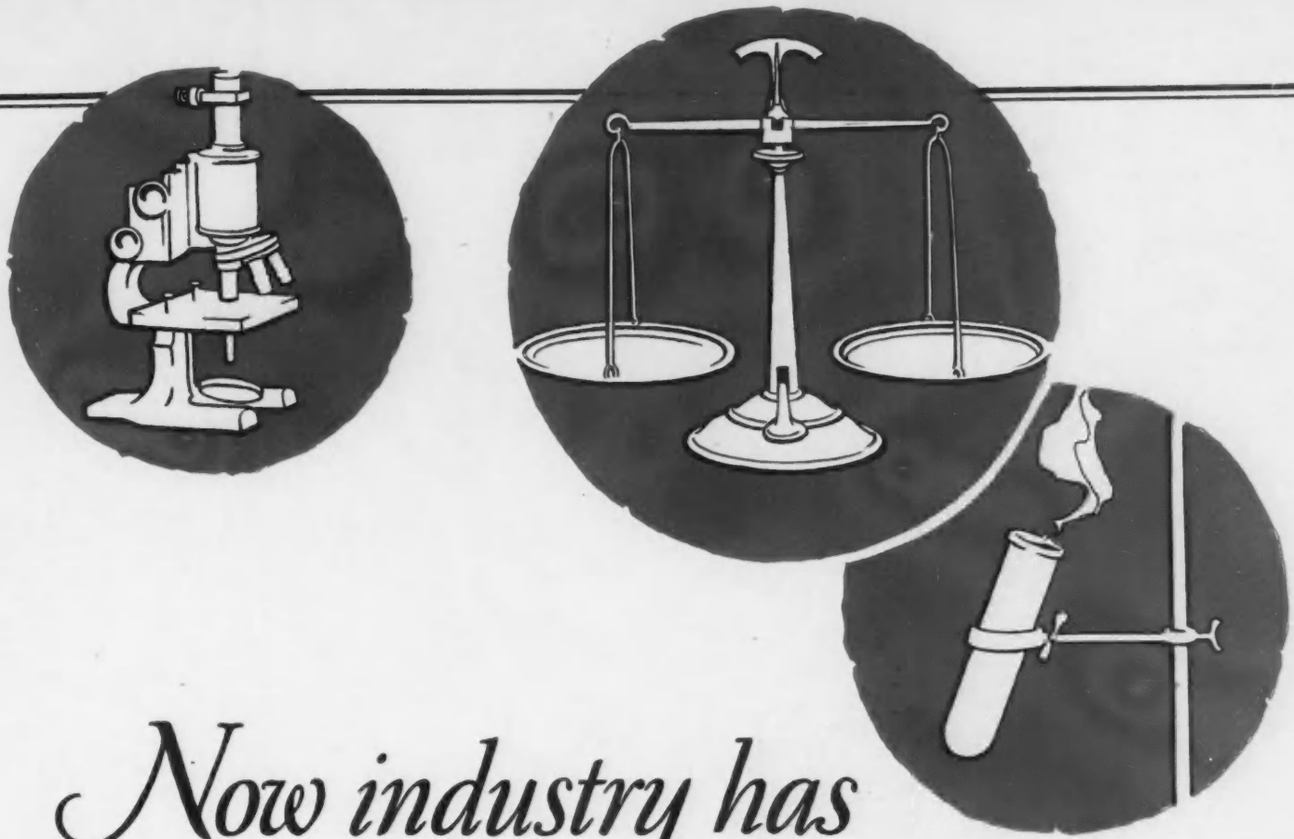
Now industry has a *new* standard



The microscope, the balance, the test tube are all means of holding products to strict physical standards. And now comes the Graybar tag, marking electrical supplies held to an invisible standard—that of quality.



Now industry has a new standard to guide it

SCIENCE gives to industry standards of measure and weight accurate to a hair. The Graybar tag gives to industry a standard of quality, inflexible and just as indispensable.

For the Graybar tag is the sign and symbol of the great Graybar Electric distributing organization. As such it is associated with a matured experience of 56 years (under the former title of Supply Dept., Western Electric); a vast array of 60,000 electrical items; and a strategically located group of 58 distributing houses. These, combined, make the Graybar tag a universal standard of satisfaction in all things electrical.

GraybaR

ELECTRICAL SUPPLIES

Successor to *Western Electric* Supply Dept.

Offices in 58 Principal Cities. Executive Offices: 100 East 42nd Street, New York

What's back of a tag?

60,000 electrical supplies . . . . a far-flung distributing chain reaching into fifty-eight cities . . . . a service of supply covering every electrical need . . . . a history of past performance stretching back over fifty-six years . . . . all these back of a tag . . . . the Graybar tag, under which quality electrical supplies are shipped.

Out on the copper highways

IN blazing sun and blinding blizzards, the bronzed guardians of service carry on. Theirs is the responsibility of constructing, and maintaining constant service on the copper highways of the country.

Ask them about wires, if you would know the opinions of men who actually handle and work with wire. Ask, too, the engineer in charge of distribution. For he will give you the engineering viewpoint.

From both lineman and engineer you will hear only good of Rome Weatherproof Wire and Rome Cutting-in Cable. They have the same complete confidence in these Rome products that is evidenced by thousands of others throughout the industry for all Rome wires. A confidence founded on never varying quality.

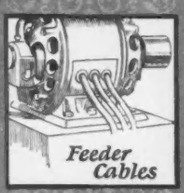
In twenty years the Rome Wire Company has grown from a small wire shop to mills that cover twenty acres of manufacturing floor space. Rolling, drawing, insulating each of its many wires and cables in these mills. Justifying industry's confidence by never-ceasing inspection.

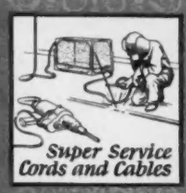
Solid Weatherproof Wire

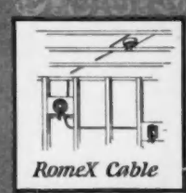
ROME WIRE COMPANY, ROME, N.Y.

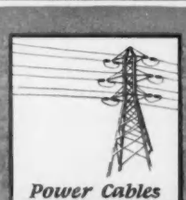
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE









BAKED at 125° F. and frozen at 10° below zero before it is released by the inspection department—is there any wonder that Rome Weatherproof Wire stands up on the job despite blazing summers and roaring winters?

It is just such careful testing, and inspection of all Rome Wires and Cables, that has built their reputation for quality thruout the electrical industry. Backed by the facilities of twenty acres of manufacturing floor space, bettered by the judgments of twenty years of manufacturing experience, every Rome Wire stands out as a quality product.

If you will let us know what wires and cables, shown on this page, you are interested in, we will be glad to send you samples, catalogs, and other information that will be of help to you—while an opportunity to quote on any of your wire requirements will always be welcome.

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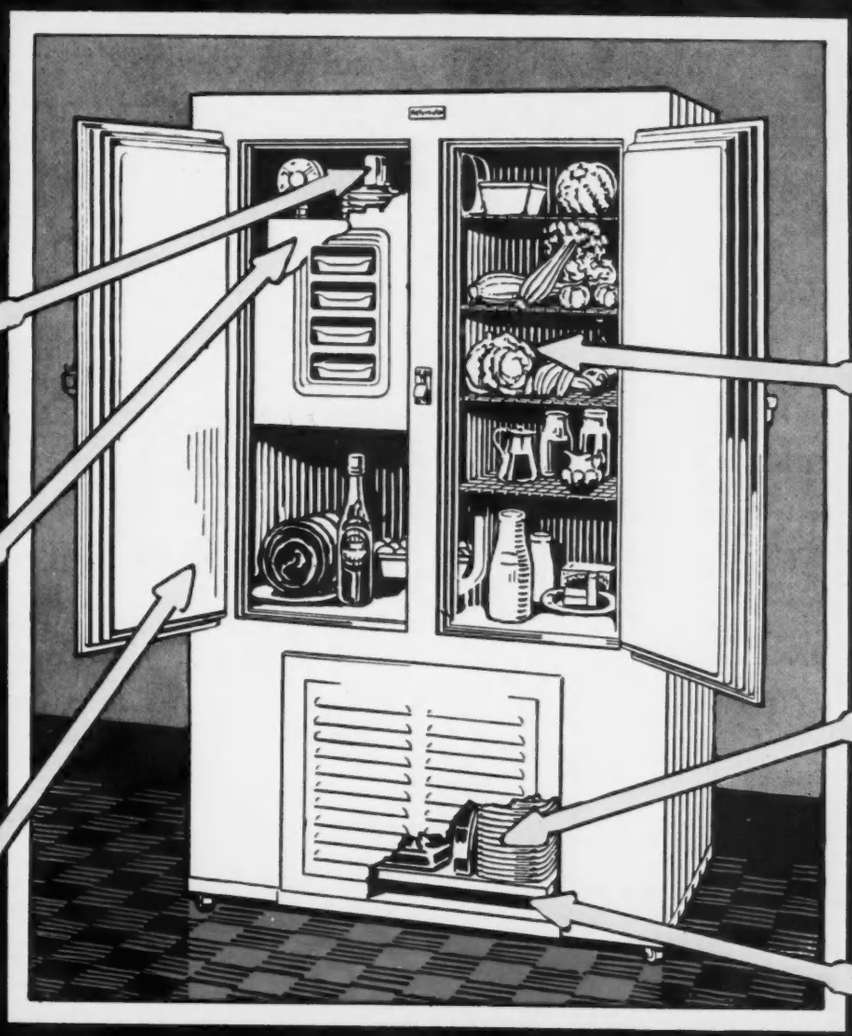
6 of the many *reasons why*



Kelvinator

is "Better always Better"

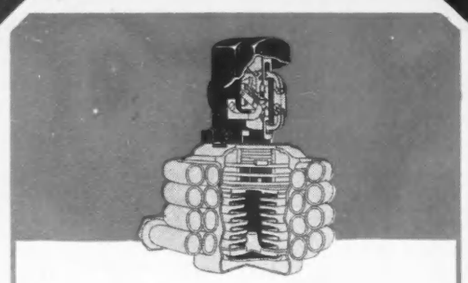
The Firm Beneath Kelvinator

THERE'S a firm, tangible foundation beneath Kelvinator's acknowledged superiority in the electric refrigeration field. That foundation consists of fundamental mechanical features that make Kelvinator really better — more dependable—longer in life.

Six of these features are illustrated herewith. Any one might be changed or even eliminated to lower the price, but then Kelvinator wouldn't be *Kelvinator*—acknowledged world's standard.

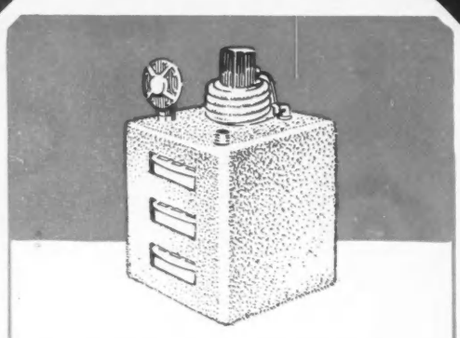
Kelvinator gives these extras at a price *lower* than that of any other electric refrigeration, model for model and quality for quality.

The reason is simple. Kelvinator is built by the world's largest and oldest organization



1 Kelvinator thermostatic control guarantees accurately regulated and *uniform* low temperatures.

Kelvinator uses the more costly thermostatic control because only a thermostat is responsive to refrigerator temperatures. The Kelvinator thermostat is the result of years of development, and we believe it to be the nearest to trouble-free in use today.



2 Storage Reservoir of cold prevents interruption of service—reduces starts and stops.

Kelvinator, through the use of a storage tank type of freezing unit, operates with just about one-fourth the stops and starts required by systems using bare coils. This means longer life. It also prevents interruption of service because it holds a 24-hours' supply of cold, even if current is shut off.

3

Cabinets

built up of eight and nine insulating layers; the most efficient made.

The Cabinets used by Kelvinator in Cabinet Models are Leonard designed and Leonard built. Every Cabinet is cork-insulated. We believe them to be the very finest cabinets it is possible to make—regardless of price.

Foundation
Acknowledged Superiority

devoted exclusively to the manufacture of electric refrigeration. Manufacturing plans and processes developed by Kelvinator during its years of experience permit the use of these extras *without* an exorbitant premium in price.

When you handle Kelvinator you permit your customers to choose from the world's most complete line. You give them exactly the model and size they want, as well as the world's standard system.

Kelvinator's merchandising plans and policies are constantly undergoing refinements. We invite you to investigate our latest developments.

KELVINATOR, INCORPORATED

Division of Electric Refrigeration Corporation

2078 WEST FORT ST., DETROIT, MICH.

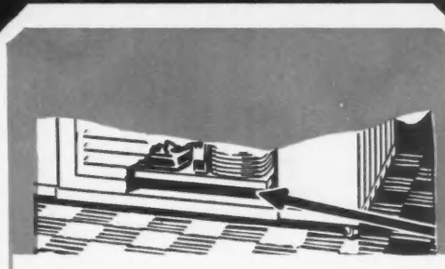
Branches;

NEW YORK :: CHICAGO :: BOSTON :: DETROIT :: ATLANTA :: BALTIMORE

KELVINATOR OF CANADA, LIMITED, 1148 DUNDAS ST. E., LONDON, ONT.

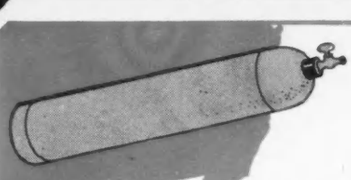
4 More food space—more ice cubes—model for model, price for price.

Compare the dimensions of Cabinet Kelvinators with those of other "makes" at or near the same price, and you'll find that Kelvinator gives more in this way, too. In a Cabinet Kelvinator customers get not only a *better* product but a *bigger* one as well.



6 Kelvinator's patented full-floating mechanism prevents vibration and noise.

Kelvinator developed and has the exclusive use of this superior feature. The base is cushioned against vibration. We invite you to investigate for yourself the efficiency of this mechanical feature, as only a demonstration can show its superiority.



5 Sulphur Dioxide—Kelvinator's refrigerant—is recognized as best, and is used in 90% of all systems built.

Kelvinator has experimented with all of the so-called "new" refrigerants in the laboratory but still holds to the standard Sulphur Dioxide. It is more stable; lasts longer; makes service easier and adds to the life of the mechanism by aiding lubrication.

Now Building

the Largest, Most Modern Plant in the Entire Industry

THE illustration above—taken from the architect's drawings—shows the great new plant of the Electric Refrigeration Corporation now about 30% completed.

It will be in operation in 1927, giving Kelvinator facilities for serving the trade as it has never been served before.

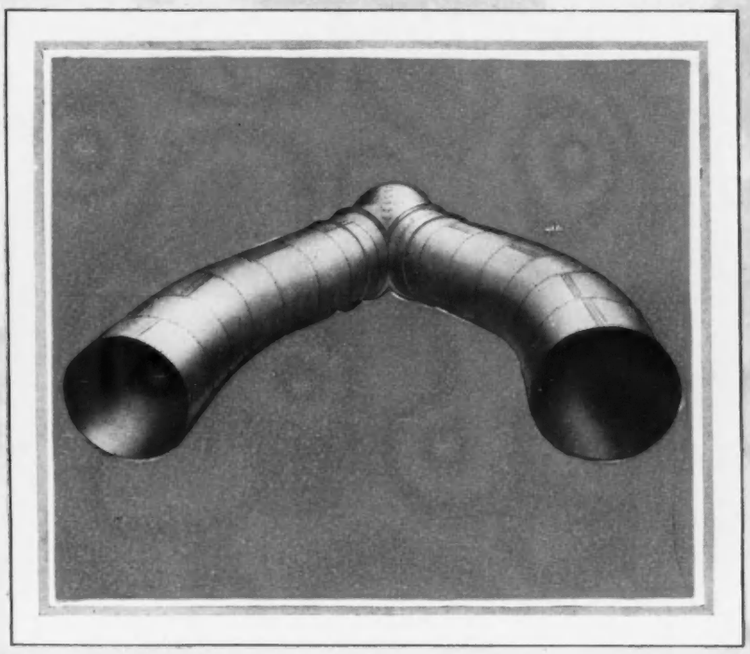
Kelvinator is looking years ahead in the building of this new plant, and the outside Kelvinator organization will benefit at once.

Nizer-Kelvinator Ice Cream Cabinets will also be made here.

Kelvinator

The Oldest Domestic Electric Refrigeration

"Better-Always-Better"



PENSTOCK "Y" FOR ADIRONDACK POWER & LIGHT CORPORATION

THIS PENSTOCK Y is part of the equipment built at Newport News for the Beardslee Falls development of the Adirondack Power & Light Corporation.

A surge tank 35 ft. diameter and 70 ft. high was erected adjacent to the upper end of the 13 ft. steel penstock. The Y shown, branches from the 13 ft. penstock by 9 ft. branches, feeding the two turbines. The surge tank and penstock are designed for an ultimate head of 200 ft.

No plant is better equipped, than Newport News, by facilities and experience, to build economically, difficult and dependable and heavy plate work for hydro-electric projects. Work done at Newport News is literally "Built like a Battleship."

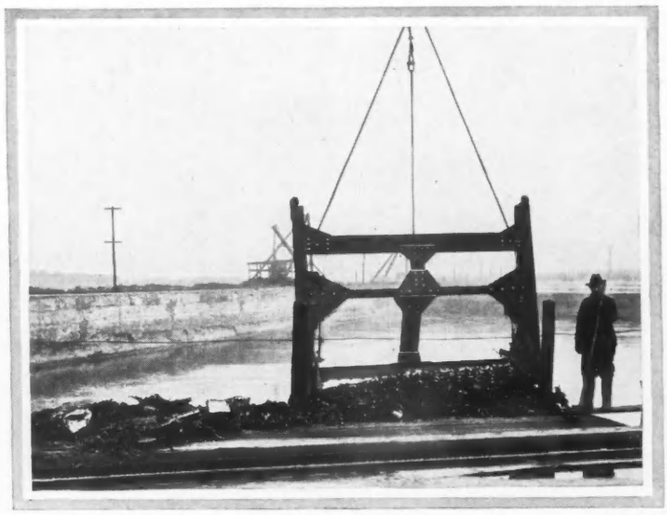
If you will address us on your business letterhead we will be glad to send you an interesting book on hydro-electric equipment: "Beating Swords into Plowshares."

HYDRO-ELECTRIC DIVISION
NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA · CHARLOTTE, N. C. · NEW YORK: 233 BROADWAY
SAN FRANCISCO AND LOS ANGELES: Water Works Supply Company
SEATTLE: Water Works and Power Equipment Company

ECONOMY

DUE to the fact that ship machinery and hydro-electric equipment bear the same mechanical characteristics, it means that your turbines, penstocks, towers, etc. are built with utmost economy in a plant where there is no idle machinery to take its toll of overhead.

The experienced engineering staff of the Hydro-Electric Division has at its command unsurpassed facilities.



SPECIAL DIGGING RAKE FOR EXCAVATING HEAVY TRASH FROM THE BOTTOM OF THE RACKS, DRAINAGE CANAL, SANITARY DISTRICT OF CHICAGO, LOCKPORT PLANT. (ONE HOUR'S ACCUMULATION OF GENERAL DEBRIS.)

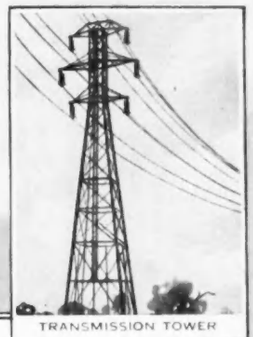
A Clean Rack Never Delays

NEWPORT NEWS Mechanical Rack Rake

LOW WATER! Manufacturers and transportation companies calling for power! Demand for every kilowatt the stream can produce!

Without a clean rack the hydro-electric plant cannot take full advantage of such water as is available. Install a NEWPORT NEWS power-driven rack rake. One man, operating the controls, can positively and continuously keep your racks free of all debris and trash which restricts water flow. By the use of the log hooks, sunken logs of major dimensions can be brought to the surface. With no delay, and practically no labor expense, the racks can be kept clean at all times and the plant operated to full capacity of your water shed.

Let us send you the book that tells about it. Write us today on your letterhead for our booklet on the NEWPORT NEWS mechanical rack rake and its application to your plant.



TRANSMISSION TOWER

3,000 H. P. TURBINE FOR VIRGINIA RAILWAY AND POWER COMPANY

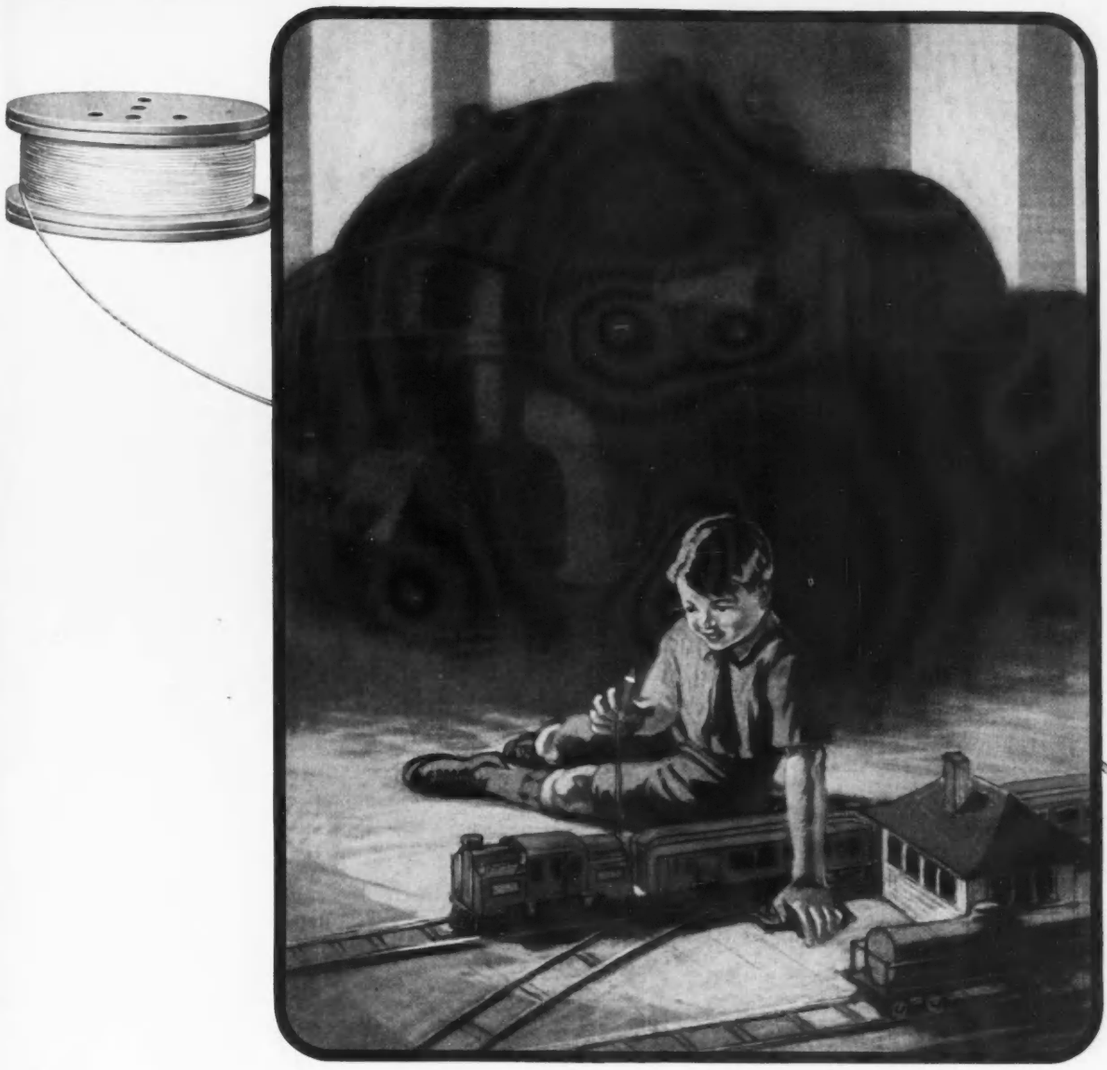
HYDRO-ELECTRIC DIVISION

NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.

NEWPORT NEWS, VIRGINIA · CHARLOTTE, N. C. · NEW YORK: 233 BROADWAY

SAN FRANCISCO AND LOS ANGELES: Water Works Supply Company

SEATTLE: Water Works and Power Equipment Company



The electrical generation

WE LIVE in the electrical age. The most loved possession of the small boy is his electric train. The most faithful servants of the American woman are her electric appliances. The most economical power for man's great industrial plants is the electric power generated by central stations.

The key to the smooth, continuous functioning of every one is a strand of copper wire. Under the surface of a multitude of these toys, appliances, and huge generators lies Rome Magnet Wire.

For throughout industry you will find a growing preference, for Rome Magnet Wire, and for all Rome Wires. There is in these Rome products a desirable quality, brought by complete manufacture, supervision, and inspection in the Rome mills—from wire bar to finished copper wire.

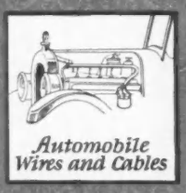
Rome Service—ample stocks and competitive prices—are at your disposal, while an opportunity to quote on any of your wire requirements will always be welcome.

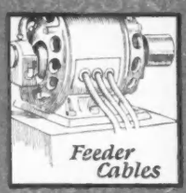
ROME WIRE COMPANY, ROME, N.Y.

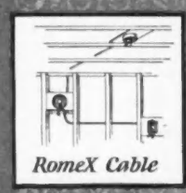
Single Cotton Enameled Magnet Wire

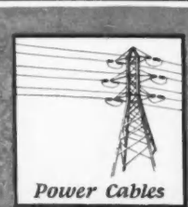
ROME WIRE

FROM WIRE BAR TO FINISHED COPPER WIRE









BECAUSE of its small outside diameter, Rome Enameled Magnet Wire is increasing in popularity every year. Particularly is this true with the manufacturers of the smaller types of electrical equipment.

Perfected by a research department that is constantly investigating and analyzing—backed by twenty years of manufacturing experience—there is small wonder that this, and all Rome wires are appreciated by their users.

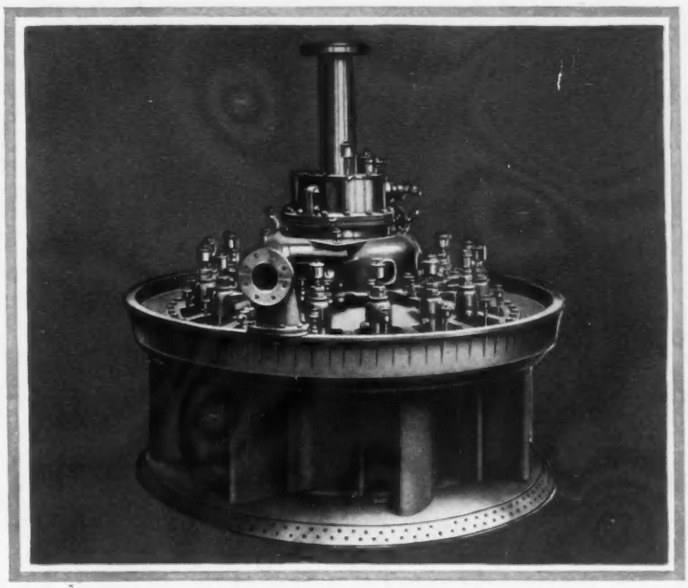
If you will let us know what wires you are interested in, we will be glad to send you samples, catalogs and other information that will be of help. To those who have a particularly difficult wiring problem, we offer the advice of our Engineering Department.

ROME WIRE COMPANY

Mills and Executive Offices: ROME, N.Y.

Diamond Branch: Buffalo, N.Y.

New York—50 Church Street
Boston—1011 Little Building
Chicago—14 E. Jackson Blvd.
Detroit—25 Parsons Street
Cleveland—1200 W. 9th Street
Los Angeles—J. G. Pomeroy, Inc., 336 Azusa Street
San Francisco—J. G. Pomeroy, Inc., 960 Folsom Street



3,000 H. P. TURBINE FOR VIRGINIA ELECTRIC & POWER CO.

NEWPORT NEWS built the second unit installed by the Virginia Electric and Power Company in its Locks Plant near Petersburg, Virginia, on the Appomattox River.

The vertical steel runner shown here runs in a steel plate spiral-casing. It is designed for a 65 ft. head and is rated at 3,000 horsepower.

Building to specifications is not the only answer to quality. Men trained in building things for the sea, build sea-worthy quality into the products of the Newport News Hydro-Electric Division.

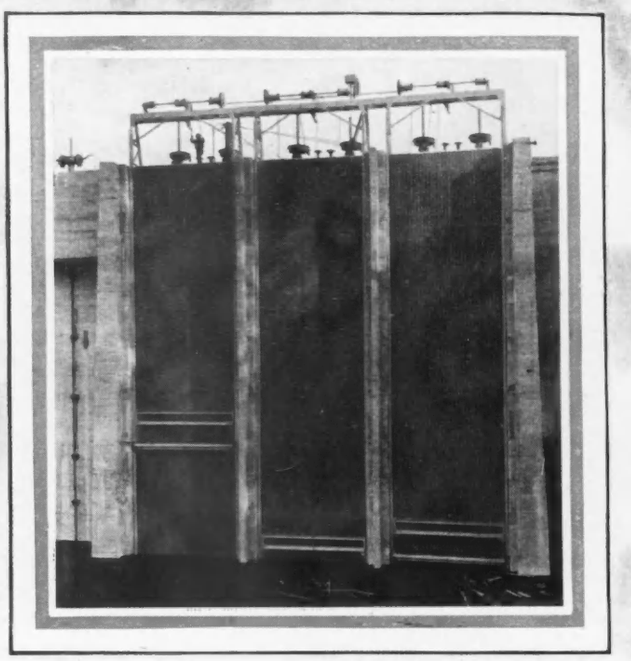
If you will address us on your business letterhead we will be glad to send you an interesting book on hydro-electric equipment: "Beating Swords into Plowshares."

HYDRO-ELECTRIC DIVISION
NEWPORT NEWS SHIPBUILDING AND DRY DOCK CO.
NEWPORT NEWS, VIRGINIA - CHARLOTTE, N. C. - NEW YORK: 233 BROADWAY
SAN FRANCISCO AND LOS ANGELES: Water Works Supply Company
SEATTLE: Water Works and Power Equipment Company

ACCURACY

DUE to the fact that ship machinery and hydro-electric equipment have the same characteristics, the turbines, penstocks, towers, etc., built at our Works, are made with the same care and accuracy as are the propelling engines for trans-Atlantic ships.

The experienced engineering staff of the Hydro-Electric Division has at its command unsurpassed facilities.



NEWPORT NEWS MECHANICAL RACK RAKES AND RACKS RECENTLY COMPLETED FOR THE CITY OF DURHAM, N. C., LOCATED AT WILLARDVILLE POWER STATION.

A Clean Rack is Essential!

NEWPORT NEWS Mechanical Rack Rake

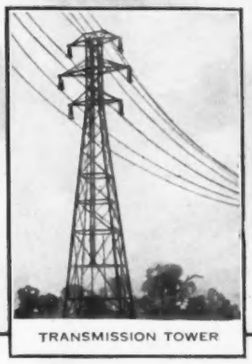
NO hydro-electric plant can run at full efficiency when racks are clogged with trash and debris. Particularly at low water, it is absolutely essential that the rack be free, so full advantage can be taken of the low water flow. Solve the problem with a NEWPORT NEWS Mechanical Rack Rake.

Do away with hand rakes and grappling irons. One man handling the controls can lower the power-driven rake, and bring to the surface the entire accumulation of debris from over the whole rack section. When necessary the log hooks can be used, raising sunken logs of major dimensions.

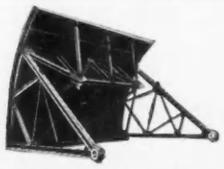
Power gain and economies soon pay for the installation. Constant employment of laborers to keep the racks free is eliminated. The rack rake does a positive, quick job, particularly valuable during ice seasons and after spring freshets.

Write today for booklet on the rack rake and its economy.

HYDRO-ELECTRIC DIVISION
THE NEWPORT NEWS SHIPBUILDING & DRY DOCK COMPANY
NEWPORT NEWS, VIRGINIA, U. S. A., NEW YORK, 233 BROADWAY

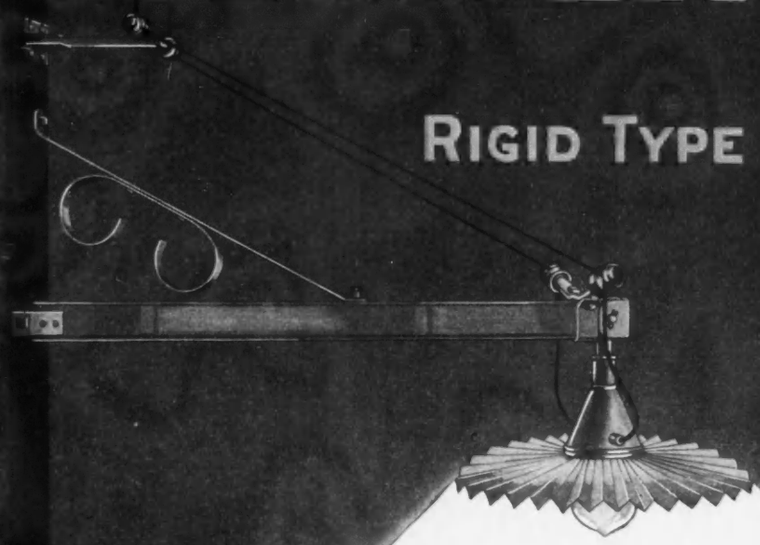


TRANSMISSION TOWER



TAINTER GATE FOR COLUMBUS ELECTRIC AND POWER COMPANY

PEIRCE PRESTEEL MAST ARM



ILLUMINATED STREETS ARE SAFE STREETS

and the best way to illuminate your streets and highways is to use Peirce Presteel Mast Arms (Rigid Type.) They guarantee SAFETY with

LOWEST PURCHASE AND INSTALLATION / OPERATING AND MAINTENANCE COST

This Mast Arm is used where lamps need not be hung more than five feet from the pole and it is braced against stresses in any direction. It is neat and attractive, and for these reasons as well as the lower costs, it is everywhere replacing the awkward looking, expensive and unsafe gooseneck.

The base of the arm is made of pressed steel which allows bending to any angle so that it can be mounted on garages or similar buildings just as easily as on poles. Made in three, four and five foot lengths and furnished either Hot Galvanized or Painted.

If you desire a longer Mast Arm, write for our MAST ARM BULLETIN which illustrates the Chain Type Arm.

Carried in Stock and Sold Exclusively on the Pacific Coast through the Graybar Electric Company, Inc., and the Pacific States Electric Company.

HUBBARD

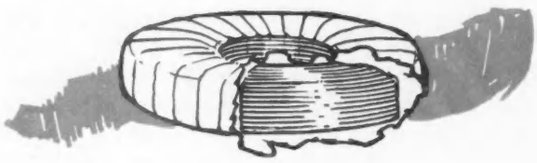
Hubbard and COMPANY

PITTSBURGH · OAKLAND, CAL. · CHICAGO

Just one series of HOLES

and one series of supports are needed for ROMEX Cable.

Lower secondary wiring costs come with ROMEX installations for many reasons. It comes in one piece—all assembled—and works directly from the coil.



The contractor makes more money because the complete-in-itself feature of ROMEX permits a big cut in stock, a faster turnover, and less stock space

. . . . besides
saving him trips back and forth from the job to his shop, for additional supplies of the many parts required for other wiring systems.

ROMEX offers your community a safer, better method of secondary wiring . . . . and helps to increase your residence load.

If you are not fully familiar with ROMEX, we suggest that you write at an early date for the latest booklet "Some facts about the installation and construction of ROMEX."

ROME WIRE COMPANY, ROME, N.Y.

ROMEX
NON-METALLIC SHEATHED CABLE

And for the small electric refrigerator TIREX SJ *cord, of course*

Along with everything else that is of the ***best,*** manufacturers will do well to equip their household electric refrigerators with Tirex SJ cord. It is very good to look at, being smooth, sleek and sturdy. Moreover, it is tough and durable. Oil, grease, acid or water has no effect upon it and once installed, it will last indefinitely.

Tirex SJ Cord is made exactly like Tirex Portable Cord, the only difference being that Tirex SJ is listed only in sizes No. 16 and No. 18 and that it is lighter in weight and smaller in diameter.

Whatever your appliance, equip it with Tirex SJ cord and give it a trial. You will like it. Check us up on this Tirex SJ cord. *Mail the coupon today.*

SIMPLEX WIRE & CABLE Co

MANUFACTURERS

201 DEVONSHIRE ST. BOSTON

New York Chicago San Francisco
Cleveland Saint Augustine

Simplex Wire & Cable Co.,
201 Devonshire St., Boston, Mass.

Gentlemen:

Please send data and sample of Tirex SJ Cord.

Name.....

Name.....

Title.....

Company.....

City.....State.....

The Coil's the thing that makes Radio

No Radio Unit Is Any Better Than Its Coil

EVERY Electrical or Radio Engineer knows that *it's the coil that does the work* in electrical apparatus.

The audio transformer is a good example of this important truth. Unless the coil is just right—to the minutest detail—improper amplification distorts the true tone values of an otherwise fine set.

The most successful manufacturers of Radio and other electrical apparatus now realize that *coil winding is so highly a specialized field* of Electrical Engineering that it pays from every standpoint—quality as well as economy—to use Dudlo Coils.

This is manufacturing wisdom that shows up in the profit column.

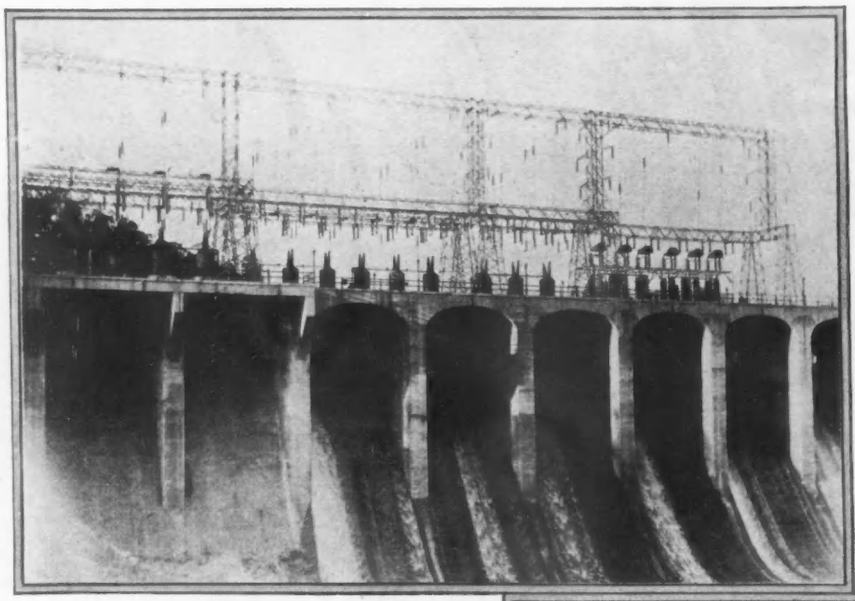
If you are an electrical manufacturer, you are probably using Dudlo Coils now. If not, you are cordially invited to make our experimental laboratories a department of your own organization. We will either assist you in the design and development of your coils or quote on coils built to your specifications. Correspondence invited.

Western Representative: A. S. LINDSTROM COMPANY

274 Brannan Street, San Francisco, Calif. | 524 N. San Pedro St., Los Angeles, Calif. | 146½ N. 10th St., Portland, Oregon | 95 Connecticut St., Seattle, Washington | 221 Southwest Temple, Salt Lake City, Utah

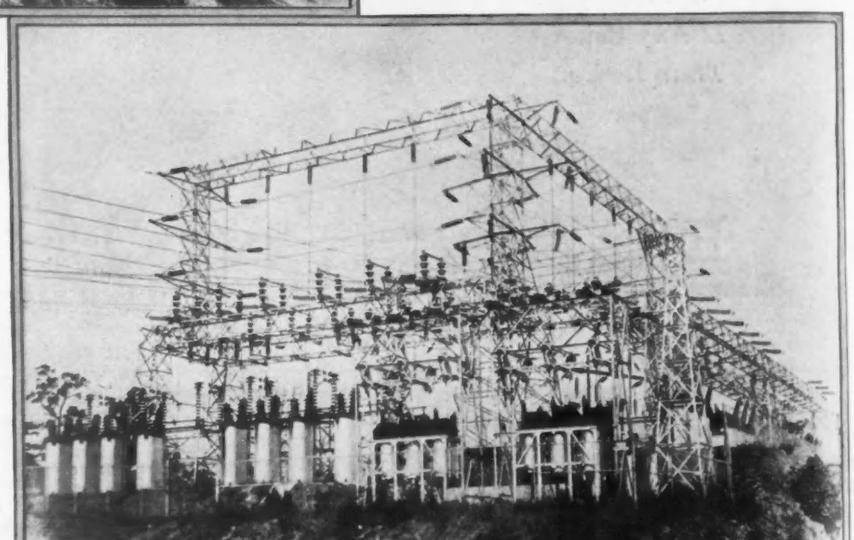
DUDLO
THE WORLDS LARGEST MANUFACTURERS
OF FINE MAGNET WIRE AND WINDINGS
DUDLO MANUFACTURING CORPORATION FT. WAYNE, IND.

Eastern Office and Warehouse: 412 Chamber of Commerce Building, NEWARK, N. J. Chicago Office: 160 North La Salle Street, CHICAGO, ILL.



West end of Mitchell Dam with 110,000-volt switching station.

Alabama Power Serves the South and West



Outdoor substation, near Clanton. 110,000-44,000 volts.

Power Co.

the South

with O-B Insulators

WITH over 3000 miles of transmission and distribution lines, Alabama Power Company service extends over the State of Alabama.

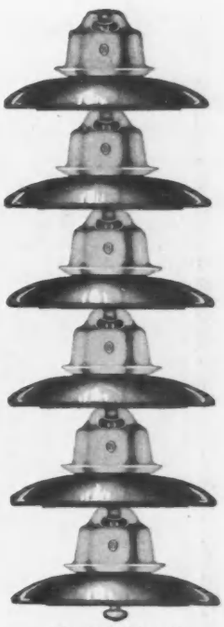
In anticipating growth of power requirements and in maintaining a high record of uninterrupted power service, this company has assisted the cotton, coal and iron industries of this territory in their rapid growth.

Interconnection with five other prominent power companies guarantees capacity in power and further safeguards the power users against costly interruptions, not only on Alabama Power Company lines, but on the lines of the interconnected companies as well.

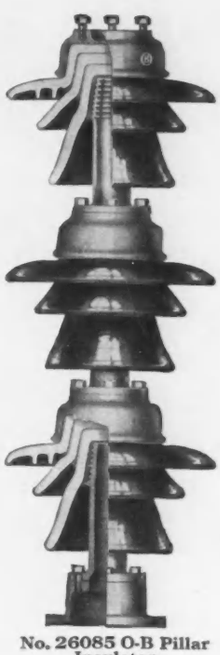
Here is a public utility development fully meeting the industrial and community needs for electric power.

And here are O-B Insulators meeting the demand for continuous operation and low annual cost through long life.

Ohio Brass Company, Mansfield, Ohio
Dominion Insulator & Mfg. Co., Limited
Niagara Falls, Canada
109H



No. 25620 O-B Suspension Units
With the efficient and convenient ball and socket connection.



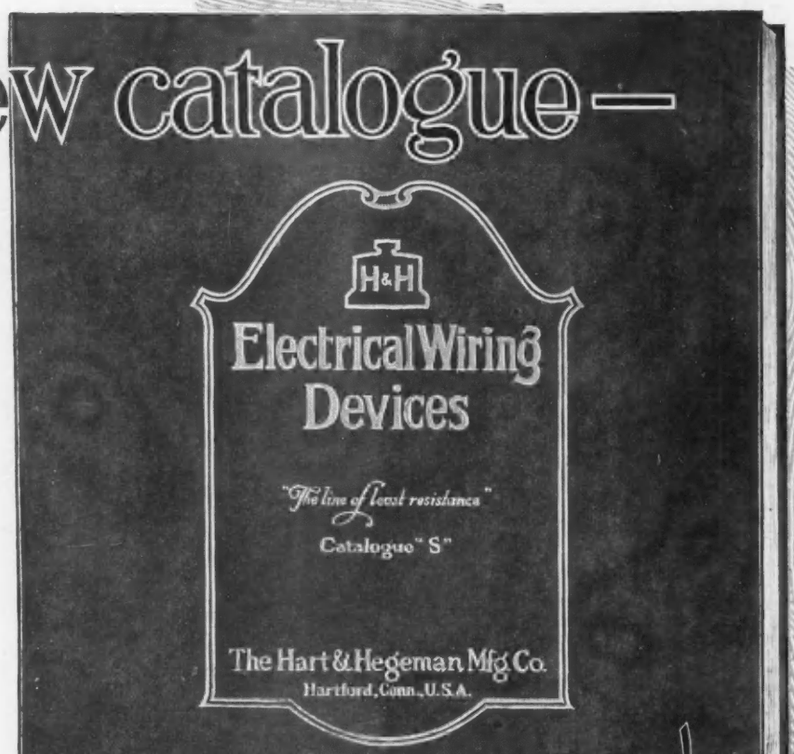
No. 26085 O-B Pillar Insulator
Can be built up as desired by bolting together interchangeable units.

Ohio Brass Co.

PORCELAIN INSULATORS
LINE MATERIALS
RAIL BONDS
CAR EQUIPMENT
MINING MATERIALS
VALVES

1890 saw the start of this H&H complete-line catalogue of 1926

new catalogue—



new contents OK

Every Contractor will "sign" for their value

NEW LISTINGS of Flush Switches, Snap Switches, Canopy Switches. Adjustable Candle Sockets and Canopy Receptacles. Combined Tumbler Switches and Receptacles—many more "new ones."

All the best designs and helpful improvements of the past year's development, added to all that has gone before and *stayed* with the trade's endorsement.

Every Contractor will "sign" for the quality and permanence of his jobs done with H&H goods. Makes it an object to *sign for the Catalogue* on the handy Coupon below.

It took 36 years to fill this book with the sort of devices you expect from the house today. It will take you one minute to *send* for it—using the Coupon.

Send me the new H&H Catalogue "S"

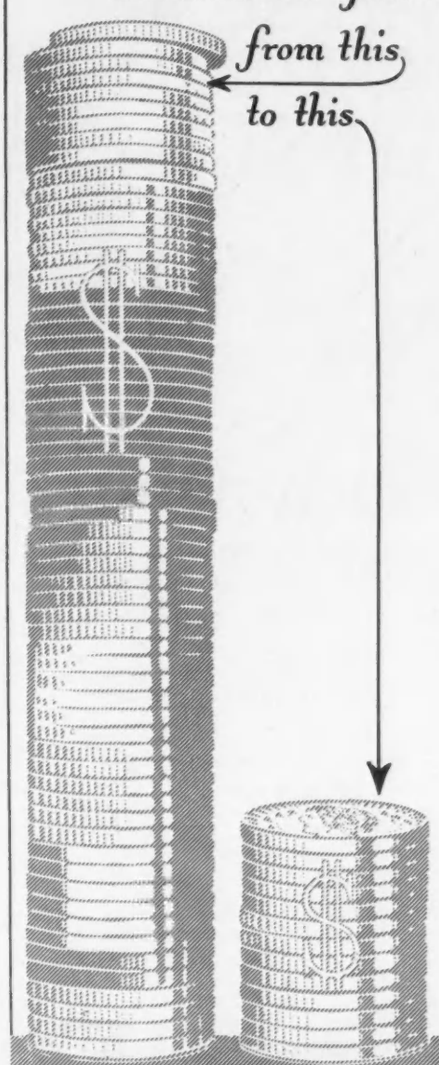
Name & Address.....

THE HART & HEGEMAN MFG. CO. HARTFORD, CONN.

New Departure Ball Bearings

in your ~ Electric Motors

will reduce your Maintenance Expense



THE figures given below are based on actual results in a factory operating 4,639 motors with a total horsepower of 41,355.

The figures on the Ball Bearing Motors are conservatively based on an installation of 100 motors in the same factory and the experience of several other plants having had from 75 to 200 ball bearing motors (each) in operation over periods of three to seven months.

Non-Ball Bearing Motors

Cost of rewinding 109 burn-outs annually	$ 9,135.00	
Cost of labor in oiling and inspecting all motors every two weeks, using crews of two men each, who oiled an average of 90 motors in nine hours	10,850.00	
Cost of 246 bearings replaced	279.00	
Cost of installing same	965.00	$21,229.00

Ball Bearing Motors

Cost of annual burn-outs reduced 70 per cent	$ 2,740.50	
Cost of labor in oiling and inspecting all motors, every nine months, using two men who oil 30 motors in nine hours	1,850.00	
Cost of fifteen ball bearings replaced	52.50	
Cost of installing same	110.00	$ 4.753.00
Saving in Annual Operating Cost by using Ball Bearing Motors		$16,476.00

THE NEW DEPARTURE MFG. COMPANY

Detroit Bristol, Conn. Chicago

San Francisco

264

This distribution curve is no joke to the man working in misapplied light. Find out how to correct such lighting conditions with the concise data in the Graybar Lighting Manual.

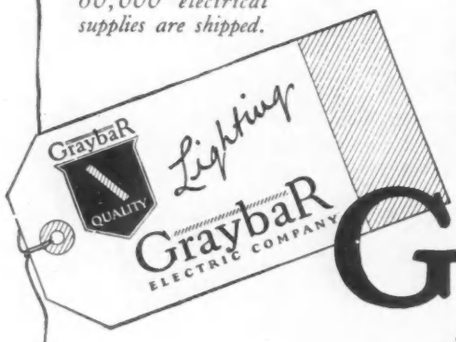
A lighting story with too much point

NO LAUGHING MATTER, this. Where the rays beat down with concentrated effect, the point of such a lighting story is painful to the eyes. Unless a very limited area were to be lighted the lighting fixture was poorly chosen, as the distribution curve shows, since it produced a spotlight effect seldom desired.

The Graybar dealer is in a position to render a real service by recommending and furnishing lighting fixtures properly suited to the conditions. And, from start to finish, Graybar helps.

The Graybar Lighting Manual shows in a comprehensive way the proper lighting and light distribution for every business, factory, and office—and recommends the best fixtures. A nearby Graybar Electric distributing house carries these fixtures on instant call.

The Graybar quality tag—under which 60,000 electrical supplies are shipped.



GraybaR

ELECTRICAL SUPPLIES

Successor to *Western Electric* Supply Dept.

680 Folsom St. San Francisco, Cal.
84 Marion St. Seattle, Wash.
301 E 8th St. Los Angeles, Cal.

2T6

5 Reasons *Why It Pays to Buy Creosoted Southern Yellow Pine Poles*

Great Supporting Strength

Southern Yellow Pine is renowned for its strength and its resistance to wind and sleet storms. Tests made by the U. S. Forest Products Laboratory show that sound, Yellow Pine has a modulus of rupture which surpasses that of other woods commercially available for poles. This means that with creosoted Southern Yellow Pine Poles you can safely use smaller poles and longer spans than with other species.

Strength Safeguarded for Years

Scientific creosoting with dead oil of coal tar, full length, by the vacuum-pressure method, in our modern plant insures that there will be no loss of bearing strength throughout the years. Through deep and uniform injection of creosote oil, Texas "Black Beauty" Creosoted Southern Yellow Pine Poles are made chemically inert and immune to the forces of decay, and to termites and the other destructive agents which quickly weaken untreated poles. They keep their strength for generations.

First Cost is their Last Cost

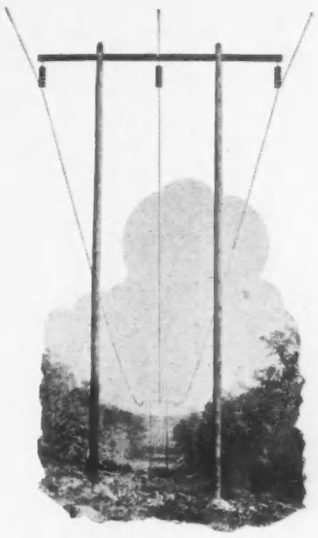
Texas "Black Beauty" Poles require no paint or attention. They serve year after year without need for replacement. Their first cost is your last cost for poles for many a year.

Decreased Service Interruptions

Breaks in service, due to pole failures, are reduced to the minimum. Less losses and more satisfied customers—two things that help any business to prosper.

A Sound Investment

Texas "Black Beauty" Poles are a real investment. They are your cheapest insurance against heavy storm losses; against a yearly drain for replacements; and against annoying and expensive interruptions to service, due to pole failures. During their long service life, they pay for themselves many times.



Texas "Black Beauty" Poles

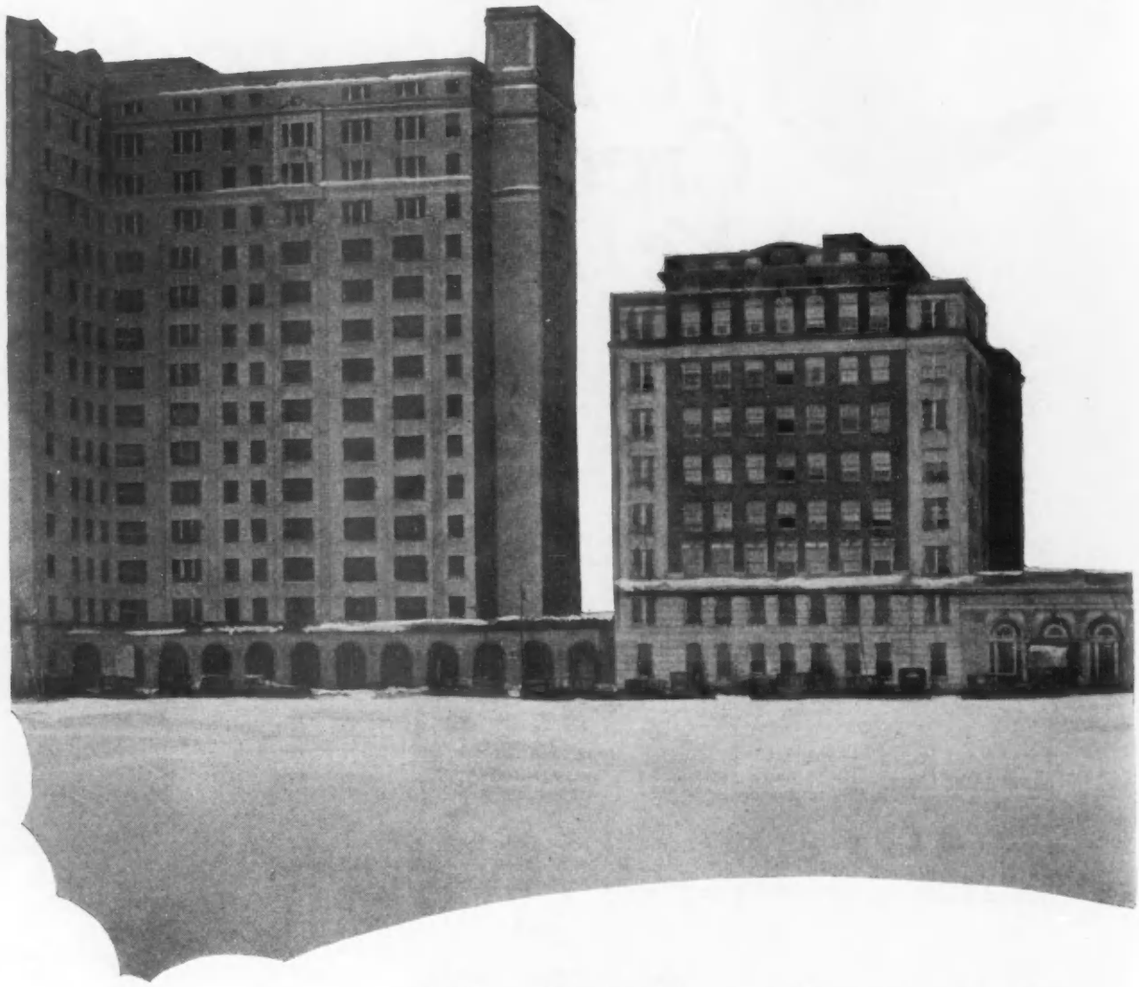
Our strategic location with respect to the source of supply of fine Yellow Pine Poles; our modern plant equipment; our highly-trained operating personnel; and our exceptional water and rail facilities, enable us to deliver Texas "Black Beauty" Poles anywhere in the country, at prices which make them "the best buy" on the pole market today. Let us quote on your requirements, treated either to your specifications or ours.

TEXAS CREOSOTING COMPANY

Main Office and Plant: ***Orange, Texas, U.S.A.***

W. W. WILKINSON, Pacific Coast Representative,
1413 Insurance Exchange Bldg., Los Angeles, Cal.

A repeat order for after three years



The Whittier Apartments

An apartment group of 218 apartments in Detroit, Michigan equipped with

"A Standard Range in Every Kitchen"

Standard Electric

Toledo,

103 *Standard* Ranges satisfactory use

It is one thing to sell an initial installation of 115 electric ranges such as were installed in the Whittier Apartment in Detroit in 1923. It is another thing, however, to sell a repeat order of 103 ranges three years later—in face of today's competition.

You want this kind of business and you **need** this type of electric range that delivers satisfactory service and brings repeat orders. The Standard Electric Range is pulling business like this throughout the country. Fill in the corner coupon and get the facts on our complete line.

Standard Model No. 423
This is the range that pulled the Whittier order. It consists of cooking top and three hot plates; an **Aluminum Lined** oven above and utensil cabinet below.

Standard Electric Ranges are made in twenty-eight different models to meet every cooking and kitchen need. Here are a few suggestions taken from our latest catalog. Full automatic, with time and temperature control, 3 models. Built-in type for small kitchen, 3 models. Combinations with gas side plates or firebox, 3 models. Fireless cooker compartments, 6 models.

Stove Company
Ohio

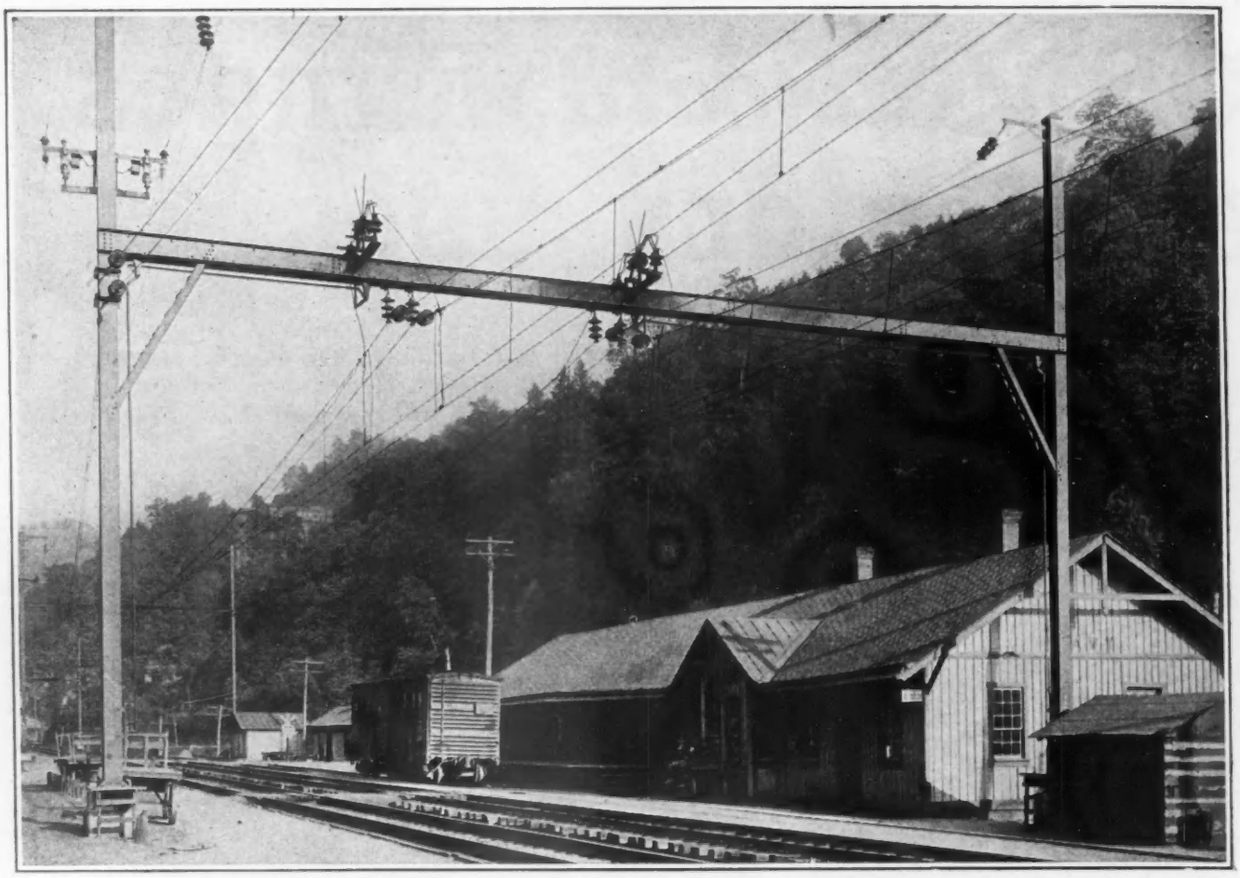
The Standard Electric Stove Co.,
Division 9. Toledo, Ohio.

Please send me your latest electric range catalog.

Address .....

Firm Name .....

Individual .....



Elpeco Horn Cap Switch

Sixty-five Switches have been Installed on this Railway System Since 1920.

for the good of the Service

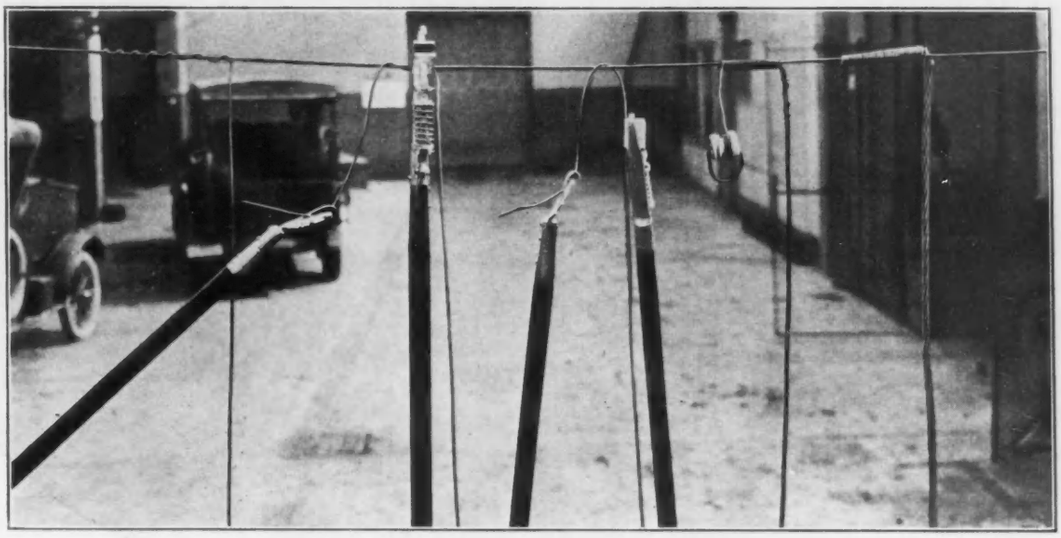
ELPEC

ELECTRIC POWER EQUIPMENT CORPORATION

412-420 NORTH EIGHTEENTH ST. PHILADELPHIA, PA.

Western Representatives: C. E. INGALLS, Rialto Bldg., San Francisco, Cal.; EICHER & BRATT, 570 Colman Bldg., Seattle, Wash.

SAFETY LIVE LINE TOOLS
Permit "Hot" Line Maintenance



Give Your Customers 100% Service
Keep Your Lines Productive

Your high tension distribution lines can be worked "hot" with perfect safety for your linemen. SAFETY Live Line Tools do the job and make money for the line maintenance department by saving time for line crews, by preventing costly service interruptions and by permitting proper maintenance at all times.

SAFETY Live Line Tools enable your line crews to perform safely every class of line maintenance and routine line work while revenue producing uninterrupted service is furnished to your customers. These tools have been in use for over two years without an accident to a workman or a property damage. Your crews can become efficient operators in less than a week. Our skilled representatives will instruct your men if you desire.

Changing a single unit of an air switch on a "hot" line without an interruption. (All "SAFETY" Tools covered by patents pending).

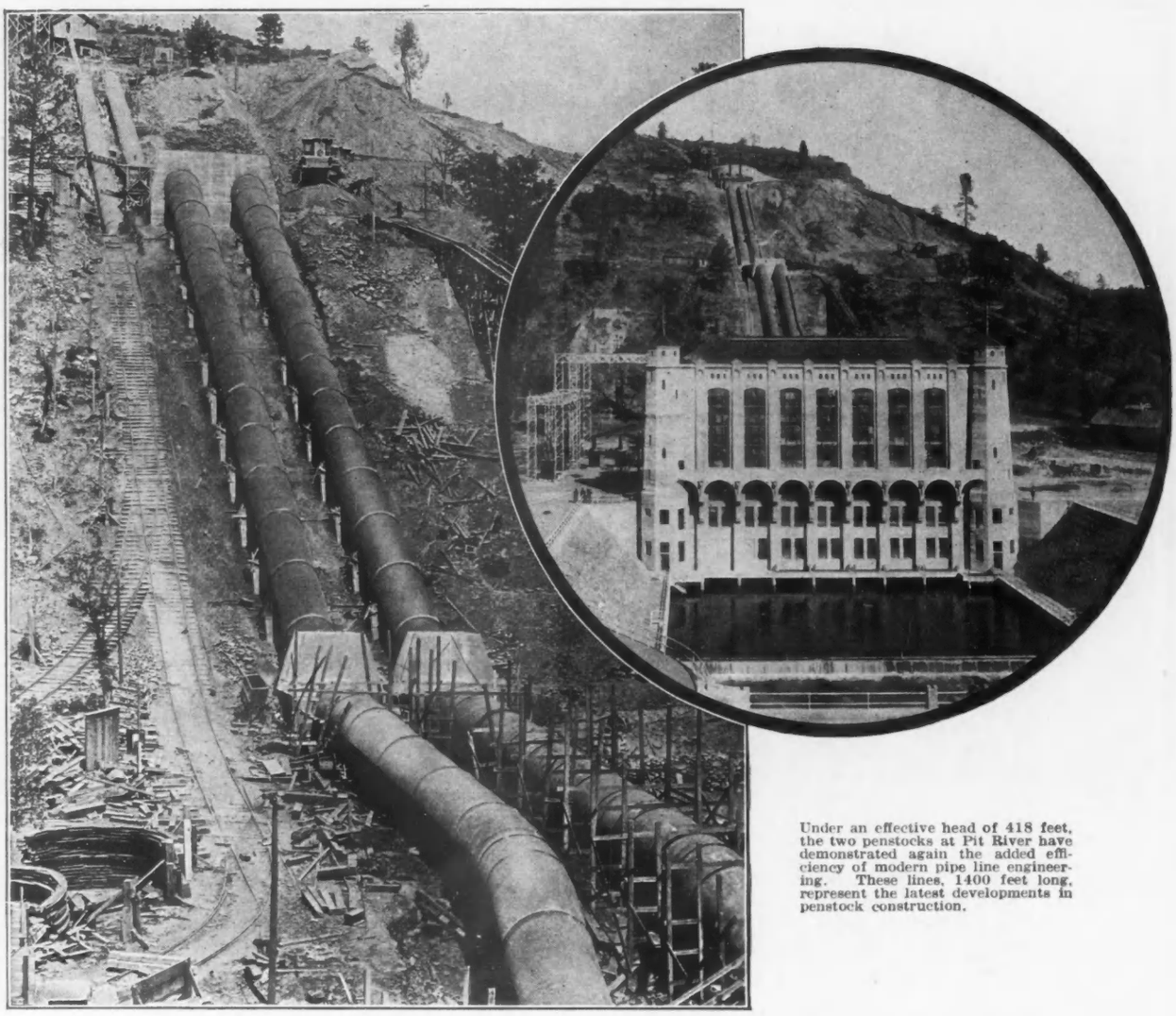
The San Joaquin Light & Power Corporation is numbered among western central stations using SAFETY Live Line Tools for maintenance work on energized high tension distribution circuits. This company now has 54 sets of SAFETY tools in daily use on its extensive system, eliminating costly service interruptions and reducing maintenance expense.

Write us for complete information, or if you prefer we shall have one of our representatives call and give you a demonstration.

"Lines Out of Service Produce No Revenue
Work Them 'Hot' With SAFETY"

SAFETY LIVE LINE TOOL CO., Inc.

223 Fifth Street **Oakland, California**



Under an effective head of 418 feet, the two penstocks at Pit River have demonstrated again the added efficiency of modern pipe line engineering. These lines, 1400 feet long, represent the latest developments in penstock construction.

Kellogg Penstocks at Pit River No. 1

Large diameter penstocks, such as installed at Pit River No. 1, of the Pacific Gas & Electric Corporation, present serious problems of friction loss, installation expense, and maintenance cost that are largely offset by KELLOGG principles of design and construction.

The use of Kellogg forge welded pipe, made with bump joints, shows much desired efficiencies both in installation and maintenance costs, which lead inevitably to its selection.

The favorable overall costs of the finished Kellogg job, as well as operating costs from year to year, repeatedly emphasize the advantages of Kellogg Pipe Lines wherever they are used.

M. W. KELLOGG COMPANY

7 Dey Street, New York City, N. Y.

CHICAGO—53 W. Jackson Blvd. ATLANTA—101 Marietta St. Bldg. SAN FRANCISCO—2929 Harrison St.
BOSTON—12 Pearl St. DETROIT—General Motors Bldg.

KELLOGG FORGE WELDED PIPE
FORGE WELDED CONTAINERS
POWER PLANT PIPING

Profitable Stocks of Goods must be Balanced

—so must a MOTOR

"A WELL-BALANCED stock is half sold," runs the adage in jobbing and retailing. Balanced stocks are those accurately proportioned to the buying habits of the community served.

Balanced motors are those in which the factors listed in the next column are accurately proportioned to one another, in view of the particular work which the motor has to do. Every motor is a combination of these factors. The proportion in which they are combined, however, governs the life and service which you get—the economy of the motor in first cost and in maintenance.

For instance, speed characteristics: Uniformity of speeds in direct-current motors is greatly affected by the magnetic qualities of the frame. Westinghouse uses rolled steel in the frames of all SK direct-current motors. As a result, they are superior in uniformity of speed characteristics—so superior that more of them are used in industry today than any other type of direct-current machine.

A motor is BALANCED when the following factors are properly proportioned to one another and to the job which the motor has to do:

Electrical	Mechanical
1. Temperature	8. Air Gap
2. Torques	9. Bearings
3. Efficiency	10. Shaft
4. Power factor (in alternating current motors)	11. Steel
5. Speed Characteristics	12. Assembly
6. Insulation	13. Rotating Smoothness
7. Commutation (in direct-current motors)	

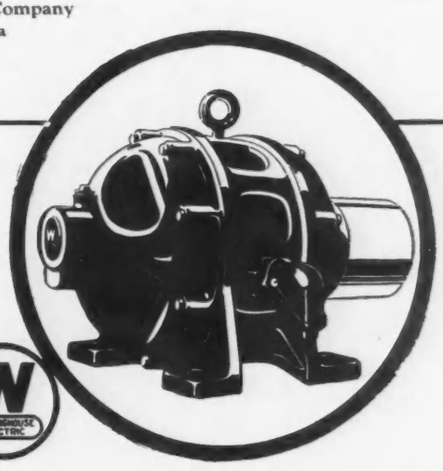
To get true value in a motor, look at ***all*** factors, not merely at one or two.

In Westinghouse Motors every factor has been weighed after years of experience extending into every industry and dating from the dawn of the motorizing idea. A truly balanced design for every purpose is the result.

X88779

Westinghouse Electric & Manufacturing Company
East Pittsburgh Pennsylvania
Sales Offices in All Principal Cities of the United States and Foreign Countries

Westinghouse Motors are Balanced



MORE PROSPECTS

Full enameled oven lining

Oven size: 14 x 14 x 17½ inches

3-heat reciprocating snap switches for each unit.

Dimensions: 37" wide, 26" deep, 41" high.

Finish: black japan, white enamel, nickeled trim

Wattage of units:

Oven, top—1500

Oven, bottom—1500

Surface, 8 inch—1500

Surface, 8 inch—1000

Surface, 6 inch—1000

ELECTRIC HOME

Copyright, 1924, by the Society for Electrical Development, Inc.

Console Range

THE new Console range will put more names on your prospect list—the names of people who have wanted an electric range big enough for the average family but who couldn't quite afford the more expensive models.

They'll be easy-to-sell prospects, too. In spite of its low price, the Console range is built of high quality materials. It is compact, efficient and well designed.

W WESTINGHOUSE ELECTRIC

HIGH QUALITY LOW PRICE

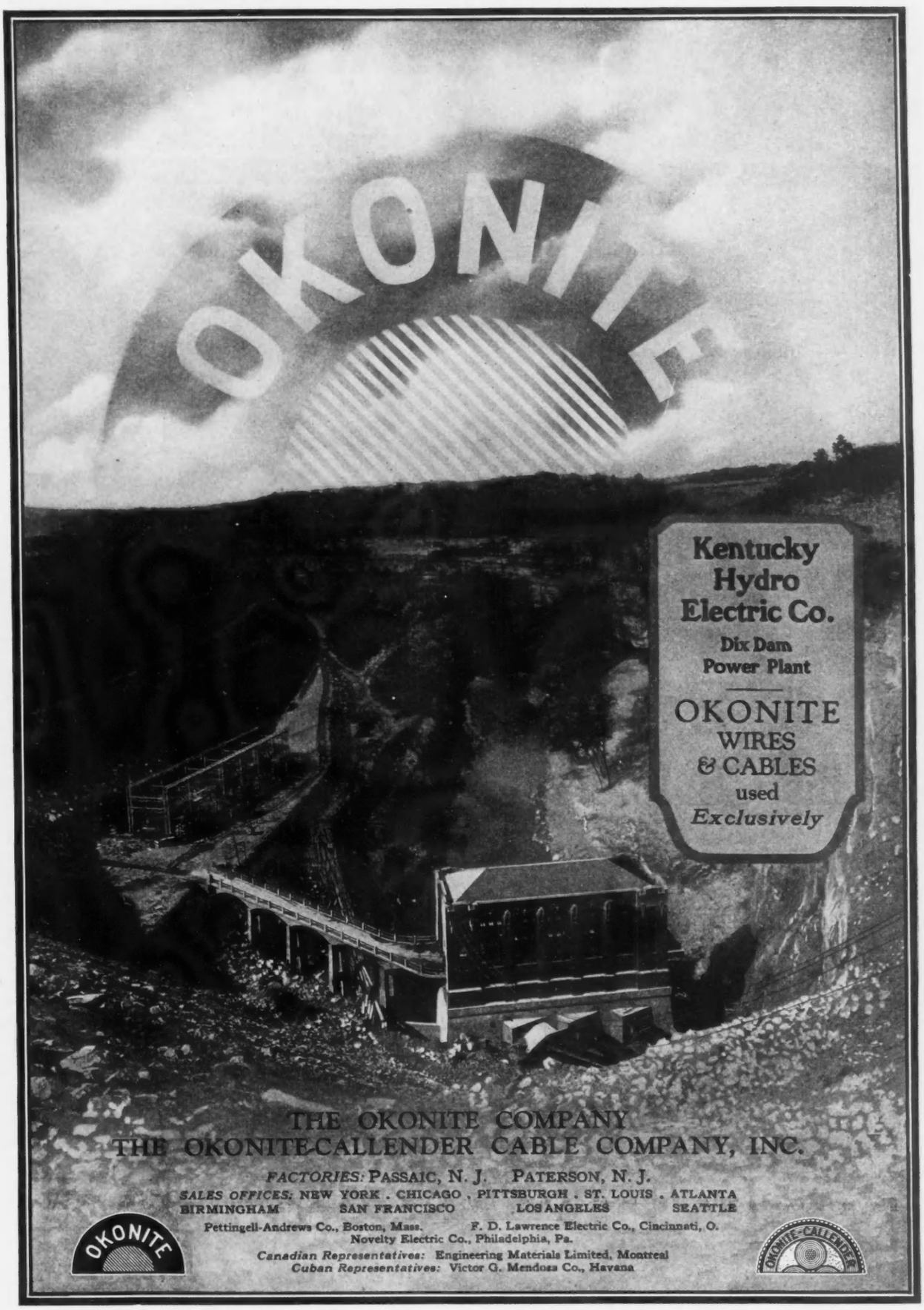
This range opens up a new sales field for you. Write our nearest district office for complete information.

Westinghouse Electric & Manufacturing Company
Merchandising Department Mansfield, Ohio

Butte, 52 East Broadway
Casper, Wyoming, 124 W. 2nd St.
Denver, 910 Fifteenth St.
El Paso, Mills Building
Fresno, Griffith-McKenzie Bldg.
Los Angeles, 420 S. San Pedro St.
Phoenix, Ariz., 412 Luhrs Bldg.
San Francisco, 1 Montgomery St.
Seattle, 3451 E. Marginal Way
Spokane, 821 Old National Bank Bldg.
Tacoma, 1117 Rust Bldg.
Portland, 901-2-3 Porter Bldg.
Salt Lake City, So. Temple & W. Temple Sts.

Westinghouse

X88791


OKONITE
Kentucky
Hydro
Electric Co.
Dix Dam
Power Plant
OKONITE
WIRES
& CABLES
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Exclusively
THE OKONITE COMPANY
THE OKONITE-CALLENDER CABLE COMPANY, INC.
FACTORIES: PASSAIC, N. J. PATERSON, N. J.
SALES OFFICES: NEW YORK . CHICAGO . PITTSBURGH . ST. LOUIS . ATLANTA
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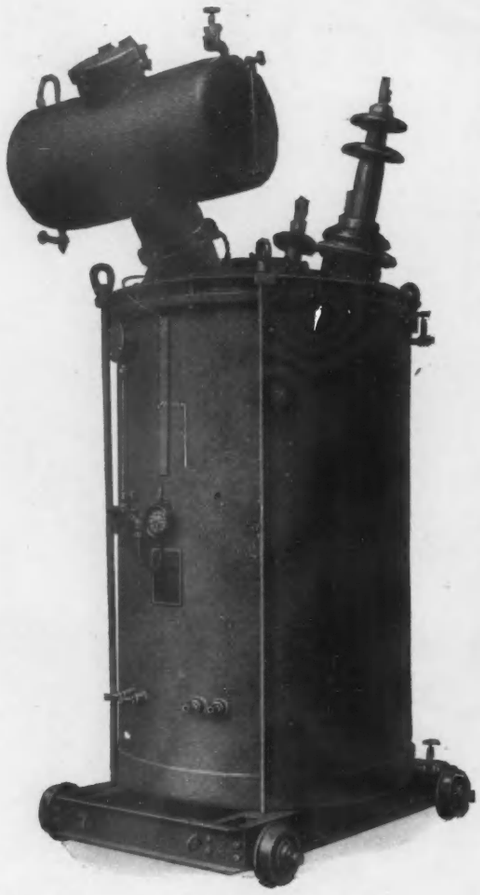
Pettingell-Andrews Co., Boston, Mass. F. D. Lawrence Electric Co., Cincinnati, O.
Novelty Electric Co., Philadelphia, Pa.
Canadian Representatives: Engineering Materials Limited, Montreal
Cuban Representatives: Victor G. Mendoza Co., Havana
OKONITE
OKONITE-CALLENDER



3333 KV-A., 52500 Volt H. V., 2670 Volt L. V., 60-Cycle, 1-Phase
Oil Insulated Water Cooled Out-Door Type Transformer

Allis-Chalmers Power Transformers

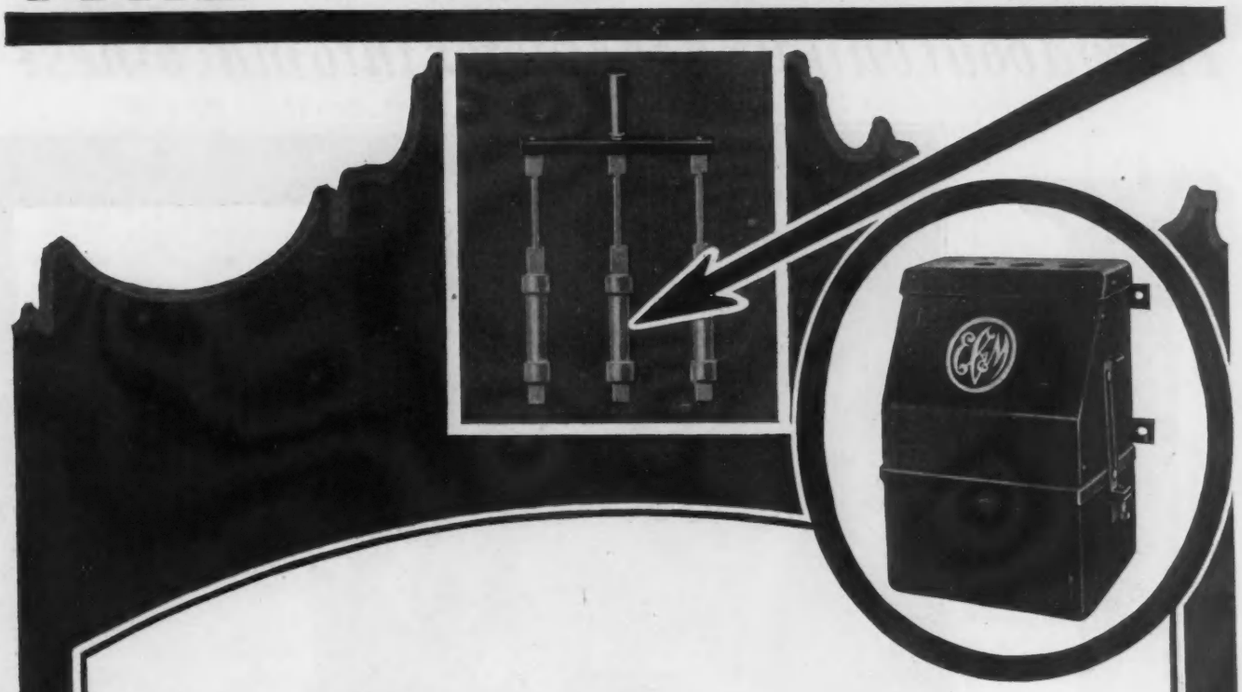
are built for any service, size or voltage. They are giving continuous uninterrupted service in many of the large generating and substations of the country which is the best assurance of high class workmanship, high grade materials and the best of engineering.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY
MILWAUKEE, WISCONSIN, U.S.A.
District Offices in All Leading Cities.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

WHAT HAPPENS WHEN THIS FUSE BLOWS ?



If the motor is running, even though it is a polyphase motor, it may continue to run as a single phase motor. The windings that remain in circuit will be forced to carry a heavy overload and in a short time the motor will burn up.

If the motor is standing still and someone tries to start it, the motor will not start. The operator may leave it connected to the power circuit and it is quite possible that the motor will burn up.

The EC&M Type ZO Starting Switch for starting A.C. motors up to 10 HP. across-the-line, protects your motors against such accidents as these and also against overloads. The EC&M expansion wire overload trip provides this protection.

Push Button Control or remote control from other push buttons, float switches, pressure regulators and the like is made possible through the use of the Type ZO Starting Switch.

All of the contacts of this Switch make and break under oil, so it is well suited for use in places where fire hazards exist.

The Type ZO Starting Switch may be mounted close to the motor, on the wall, up in the roof trusses or at any other point where space is not valuable. The push button can be placed where it is most convenient.

Write for Bulletin 1048

THE ELECTRIC CONTROLLER & MFG. CO.

BIRMINGHAM-BROWN-MARX BLDG.
CHICAGO-CONWAY BLDG.
CINCINNATI-FIFTH NATIONAL BANK BLDG.
DETROIT-DIME BANK BLDG.
NEW YORK-50 CHURCH ST.

CLEVELAND, OHIO

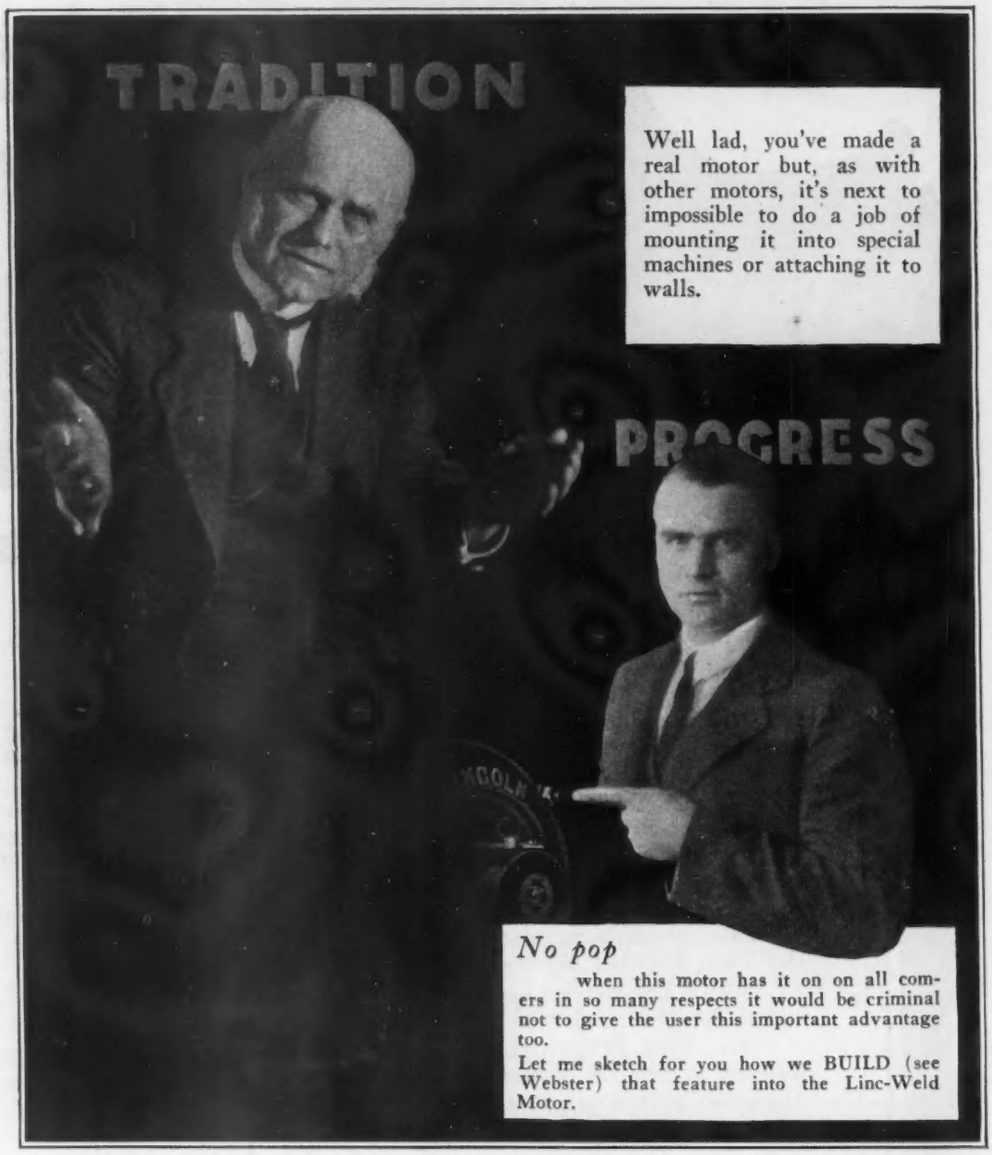
LOS ANGELES-THOMAS MACHINERY CO. AMERICAN BANK BLDG.

PHILADELPHIA-WITHERSPOON BLDG.
PITTSBURGH-OLIVER BLDG.
SAN FRANCISCO-CALL BUILDING
SEATTLE-570 COLMAN BLDG.
TORONTO-TRADERS BANK BLDG.

Let's BUILD

build (5)—to increase and strengthen: to increase the power and stability of: to settle or establish and preserve:
—*Webster*

How about building the motor into machines?

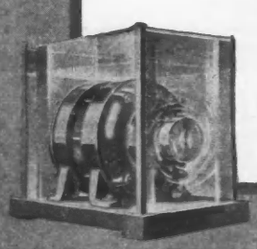


Well lad, you've made a real motor but, as with other motors, it's next to impossible to do a job of mounting it into special machines or attaching it to walls.

No pop

when this motor has it on on all comers in so many respects it would be criminal not to give the user this important advantage too.

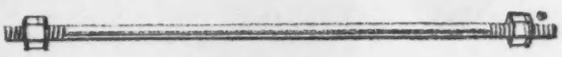
Let me sketch for you how we BUILD (see Webster) that feature into the Linc-Weld Motor.



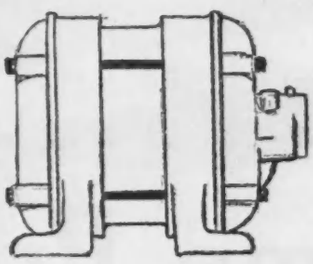
LINC

a motor! with the Stable-Arc holder

You take four bolts . . so



And you extend them right through the motor—from end bracket to end bracket . . so



Now that gives you the most rigid tightness of frame for the shaft bearings—and well worthwhile as a feature.

But it gives you that other advantage you asked especially for—a rigid means to attach the motor to your woodworking or other machines where the motor is mounted right into the machine.

And you can see its advantage too for wall or ceiling mounting by simply rotating the end brackets a quarter or half turn.

Then too, in motor assembling on maintenance work you can readily see the big advantage.

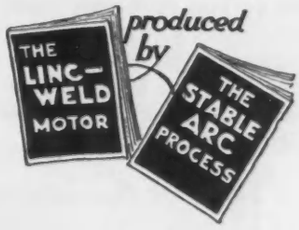
These are points so often overlooked by motor buyers—so you can hardly blame motor makers for forgetting too.

Point by point the Linc-Weld adds up to "More Motor for the Money."

Read about the construction features which prove it—in the book at the right.

Illustrated answers

Realizing that the news value of the new process motor, as well as the process by which it is constructed, will naturally bring up many questions—two very completely illustrated volumes have been prepared thoroughly covering the subjects:



These books are in envelopes ready to be sent by return mail to all persons requesting them.

For your convenience in getting your copies—simply pencil in your address on the coupon below.

The Lincoln Electric Co.

Cleveland, Ohio

-WELD

COUPON

To The Lincoln Electric Co., Cleveland, Ohio

Please send to Mr. .....

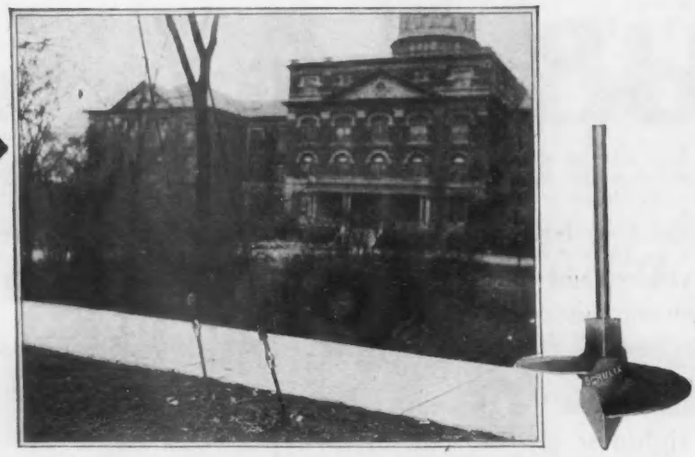
Company .....

Address .....

.....

The Motor Book ☐
The Stable-Arc Process Book ☐

4-7-1



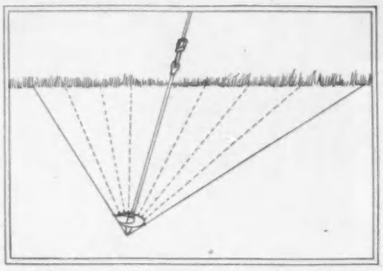
Time Proves

The difference between apparent and real holding power of Matthews Scrulix Anchors

More than one user has written us that his first impression of the probable effectiveness of Matthews Scrulix Anchors was that these comparatively small, easily handled anchors would undoubtedly fall short of the claims made for them. Their ease and low cost of installation, their neatness, and other advantages were definitely and decidedly favorable. But how could such anchors with only six to twelve inch helix possibly perform miracles of holding power in places where formerly it had been necessary to use costly and temporarily satisfactory devices? The secret lies in the design of the helix.

Tons of Resistance

The helix of the Scrulix Anchors is so designed that instead of depending merely upon the column of earth close to the shaft for holding power, it brings into play the tremendous weight of hundreds of cubic feet of earth around it. Under strain the lines of force radiate from the helix at a forty-five degree angle. For all ordinary purposes the use of comparatively small sizes is adequate.



In 5 to 15 Minutes

In less time than it takes to get a hole well started, two men can turn a Matthews Scrulix Anchor deep down under tons of earth without loosening the ground above. They come completely assembled, all in one piece, ready to install by simply screwing them into place. No moving parts to become lost or be buried unadjusted. One of the simplest and quickest operations in erection work.

No Creepage

Under water, in hard pan, loam, shale—wherever unusual anchorage problems occur—Scrulix Anchors demonstrate their advantages. No take-up in guys due to creepage is required. They hold fast permanently. Made in seven different sizes, Matthews Scrulix Anchors present an easy solution for any anchorage problem.

Learn More About Them Now

Write for Bulletin 800 covering in detail the interesting variety of applications of this anchorage principle. It will reveal to you complete mastery of anchorage problems as met by many companies during the last twenty years.

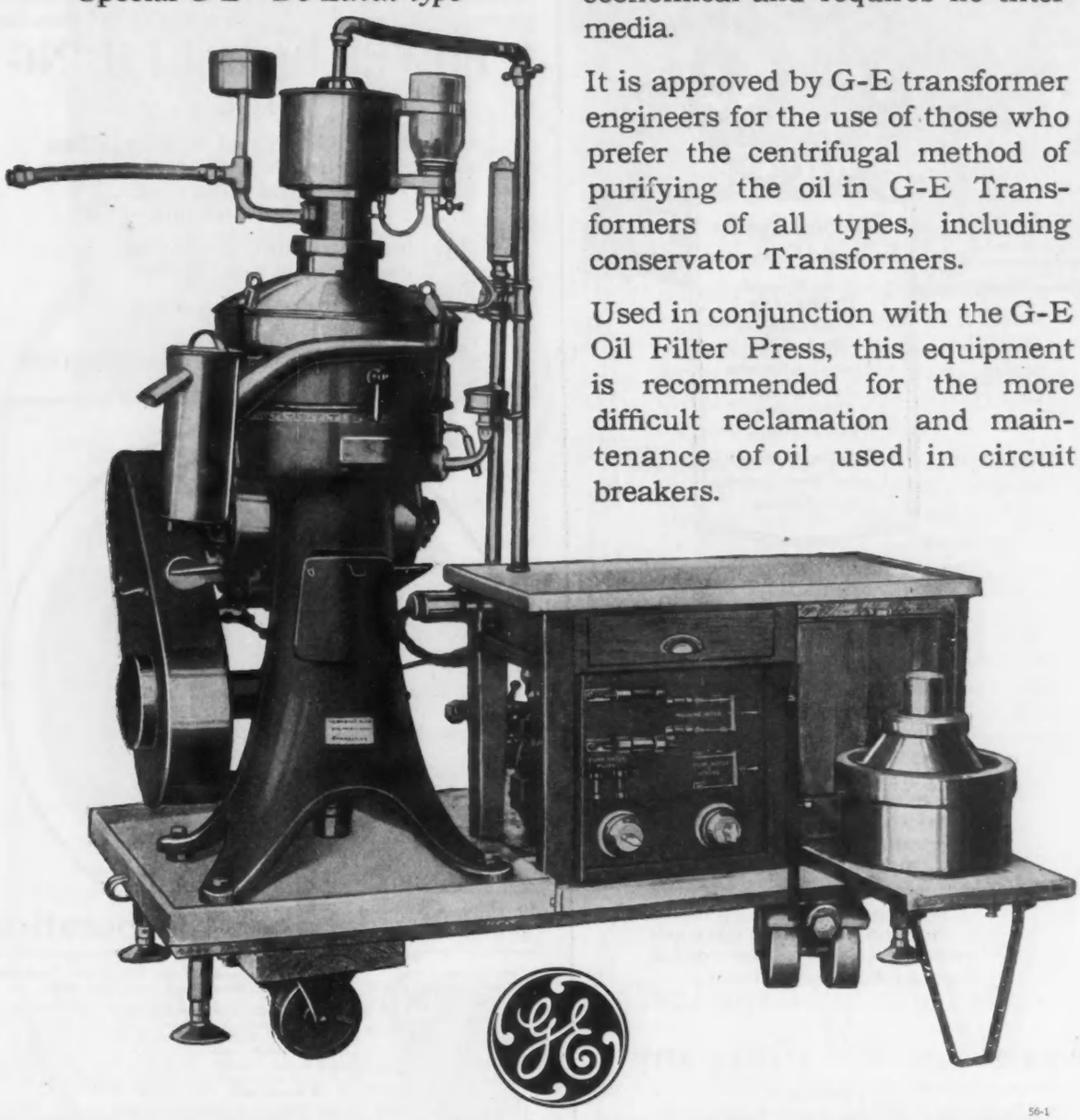
W. N. MATTHEWS CORPORATION
3708 Forest Park Blvd., St. Louis, U. S. A.

Ask about these Matthews Fuswitches Matthews Disconnecting Switches
Matthews Scrulix Anchors Matthews Adjustable Reel Matthews Guy Clamps
Matthews Slack Puller Matthews Cable Clamps Matthews Lamp Guards
60 Matthews Telefault Matthews Teleheight *Distributors in all Principal Cities.*

MATTHEWS
SCRULIX ANCHORS

A New Insulating-Oil Purifier

Special G-E—*De Laval type*



IT is a centrifugal machine specially designed for both the purification and dehydration of insulating oil, especially that used in transformers and oil circuit breakers.

It will purify oil containing large amounts of moisture and sediment, it is always ready to operate, is economical and requires no filter media.

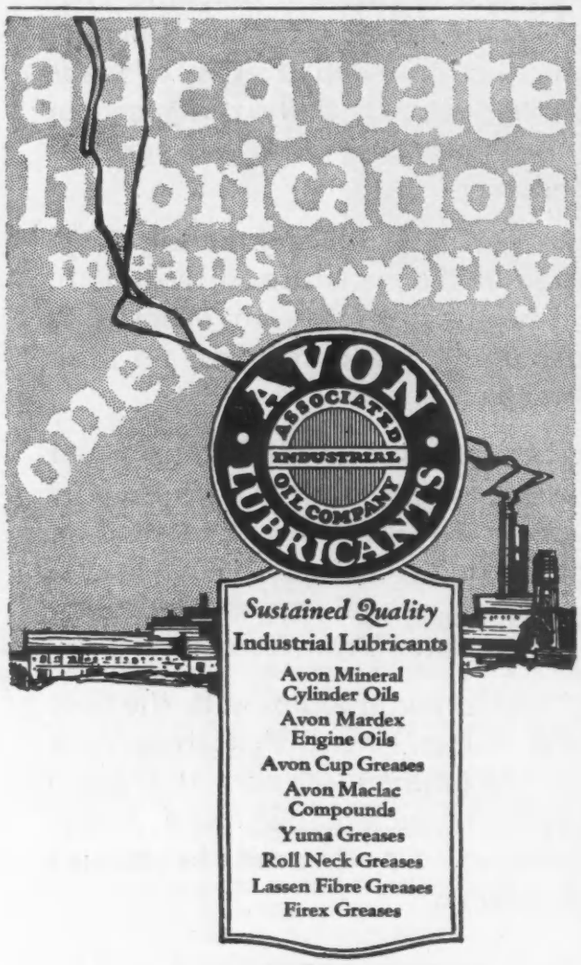
It is approved by G-E transformer engineers for the use of those who prefer the centrifugal method of purifying the oil in G-E Transformers of all types, including conservator Transformers.

Used in conjunction with the G-E Oil Filter Press, this equipment is recommended for the more difficult reclamation and maintenance of oil used in circuit breakers.

56-1

GENERAL ELECTRIC

PRACTICAL LUBRICATION SERVICE



ARE rush orders going to be shipped on time? Will production keep up at the required pace? Will supplies be delivered on schedule?

Every executive knows that a hundred and one different things can happen to hinder and delay production. Foremost among these is the breakdown that results from lack of adequate lubrication.

Make use of Associated Practical Lubrication Service and eliminate this cause of worry at least. Our engineers can prescribe adequate lubrication—the right lubricant in the right place. Then it is goodbye to lubrication failures—one of the chief worries of industry.

Associated Oil Company

District Agencies

San Francisco Los Angeles Sacramento
Santa Rosa Honolulu Fresno Portland
San Jose Stockton Oakland Seattle

Additional distributing plants at convenient points in California, Oregon, Washington and Hawaii

I-3

Another Prominent Engineer says about

PEERLESS Insulated WIRE

"Like it better to handle than insulated wire of other makes. One thing in particular we have noticed in Peerless insulated wire is that the insulation clings to the wire."

Let Us Quote You

Peerless Insulated Wire & Cable Co.
(Makers of the cotton clad time resistance cable)
90 West Street New York City

SAN FRANCISCO OFFICE—41 SUTTER STREET
Telephone; Garfield 4425
SEATTLE: W. R. HENDREY, HOGE BLDG.

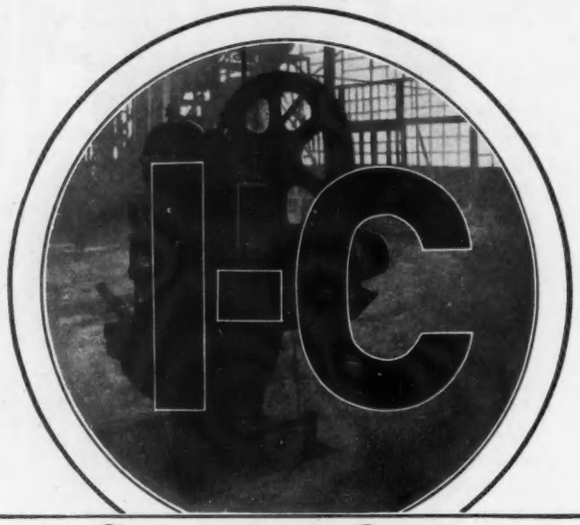
POWER PLANT PIPING

FOR

Electric Light, Street Railway, Blast Furnace, Steel Works and Industrial Plants of every description

PITTSBURGH PIPING & EQUIPMENT CO.
General Office and Works, Pittsburgh, Pa.

Oliver B. Lyman
Western Representative
Call Building San Francisco, Calif.



As they Say at **Studebaker Corporation**

1500 I-C automatic starters control all motors of 7½ H. P. and under in plant of Studebaker Corporation.

Mr. Wm. Rasmussen, *Chief Electrician, Studebaker Corporation, South Bend, Ind., says:*

"We standardized on the Industrial Controller, Class 8527, Automatic A. C. Across the Line Starter, with push button control, for all motors of 7½ H. P. or under, and at present have some 1500 installed in our South Bend factory. This was done after testing 6 makes of automatic starters for overload, service, cost of installation and general appearance.

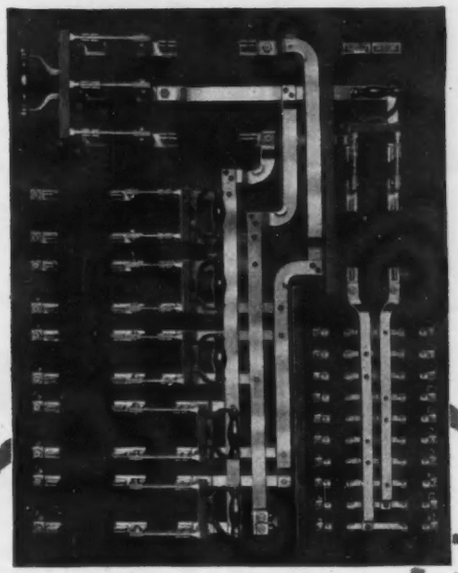
"In 6 years' use, the I-C Across the Line Starters have caused virtually no trouble, once initial adjustments were made. We estimate that they save 40% in motor maintenance, which paid for them in their first year's operation.

Industrial Controller Co.
MILWAUKEE, WIS. U.S.A.

San Francisco Office: C. E. Ingalls, Rialto Bldg.
Robinson Sales Co., Polson Bldg., Seattle; 58 4th St., Portland

Built by Masters

Benjamin-Starrett Feeder Panel Boards



There is every good electrical and mechanical reason for the specification and installation of Benjamin-Starrett Panel Boards.

Because of their extreme durability, ease of installation and good appearance they are found in prominent buildings typifying the best in architecture and construction, all over the country.

Made in all types and sizes for commercial and residential installations, including Standard Dead Front and Safety Residence Panels, Power Boards and Feeder Panels.

Steel frame gives rigidity and strength to the assembly. Molded composition bases and barriers are impervious to moisture, acid or oil.

Send for Special Literature on Panel Board Installations

Benjamin Electric Mfg. Co.

120-128 S. Sangamon Street
Chicago

New York 247 West 17th Street
San Francisco 448 Bryant Street

Manufactured in Canada by the Benjamin Electric Mfg. Co. of Canada, Ltd., Toronto, Ontario

BENJAMIN TRADE MARK

The Sturdy Benco

A Superior Industrial Socket

A husky, weatherproof socket, guarding property and profits in millions of places throughout the industrial world. A positive protection against the ravages of dampness, dirt and corrosion.

Heavy interior porcelain insulation and thick exterior shells of copper or aluminum prepare the Benco Sockets for limitless service outdoors or indoors. The unusually strong X-type fitting will "stand a wrench."

The Benco Pull Chain Socket is as weatherproof as the Keyless. A straight-down inner-pull chain control permits a full covering of the mechanism. And where necessary the Benjamin Strain Relief Cord Grip eliminates all strain on the wire connections.

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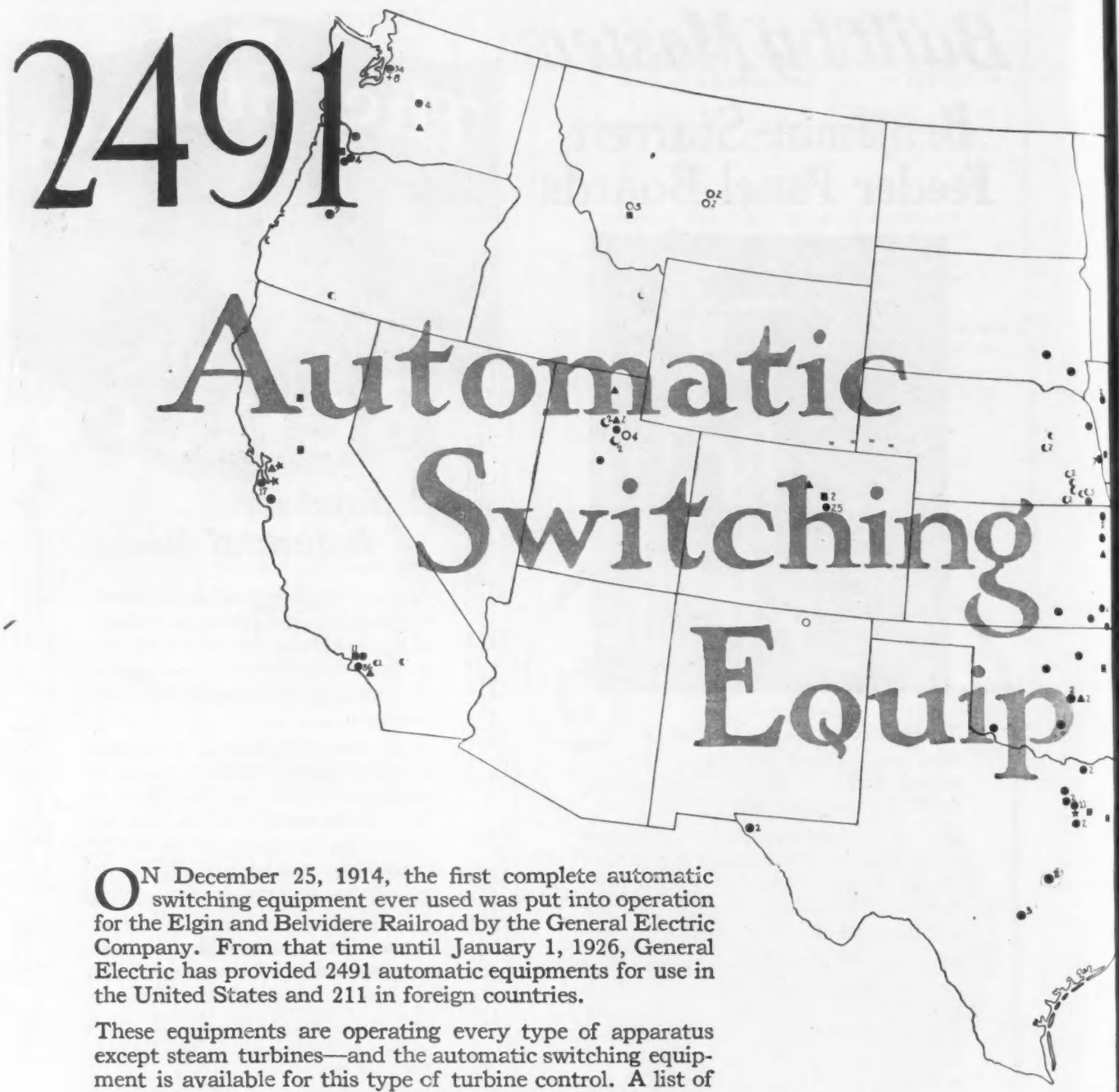
2491 Automatic Switching Equip



ON December 25, 1914, the first complete automatic switching equipment ever used was put into operation for the Elgin and Belvidere Railroad by the General Electric Company. From that time until January 1, 1926, General Electric has provided 2491 automatic equipments for use in the United States and 211 in foreign countries.

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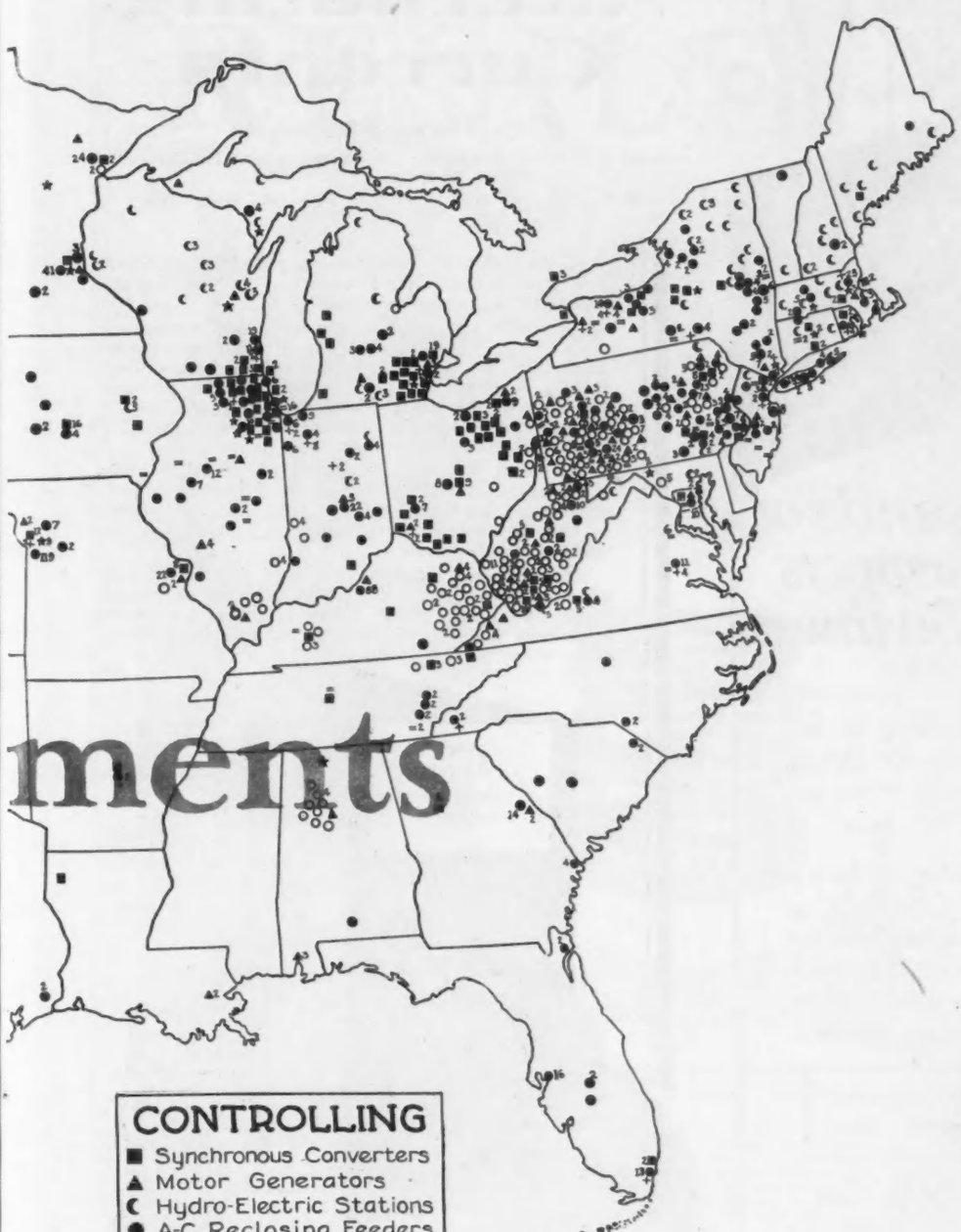

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G-E Automatic Switching Equipments applied to your switching and control problems offer many advantages—for they operate promptly, at least cost, with accuracy, safety, and reliability. Your G-E Sales Office will fully explain automatic switching equipment to you.

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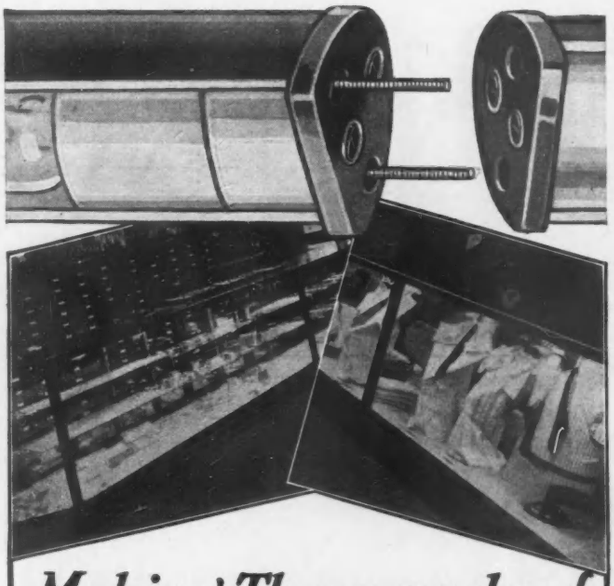

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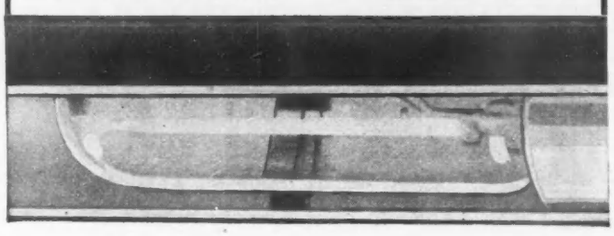

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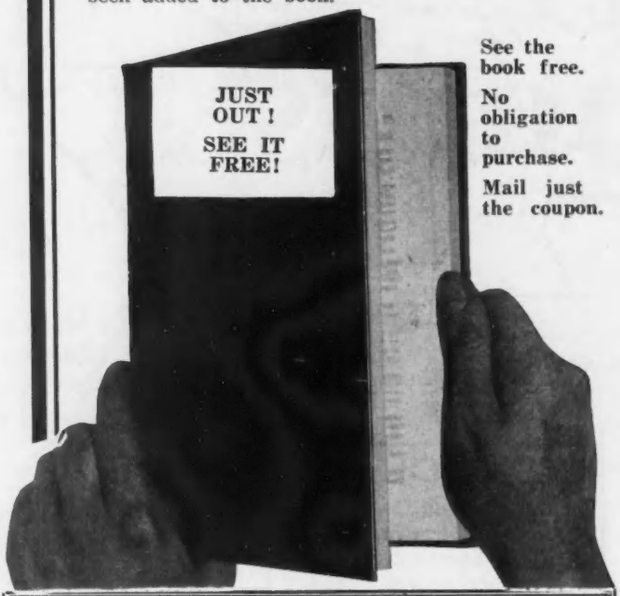

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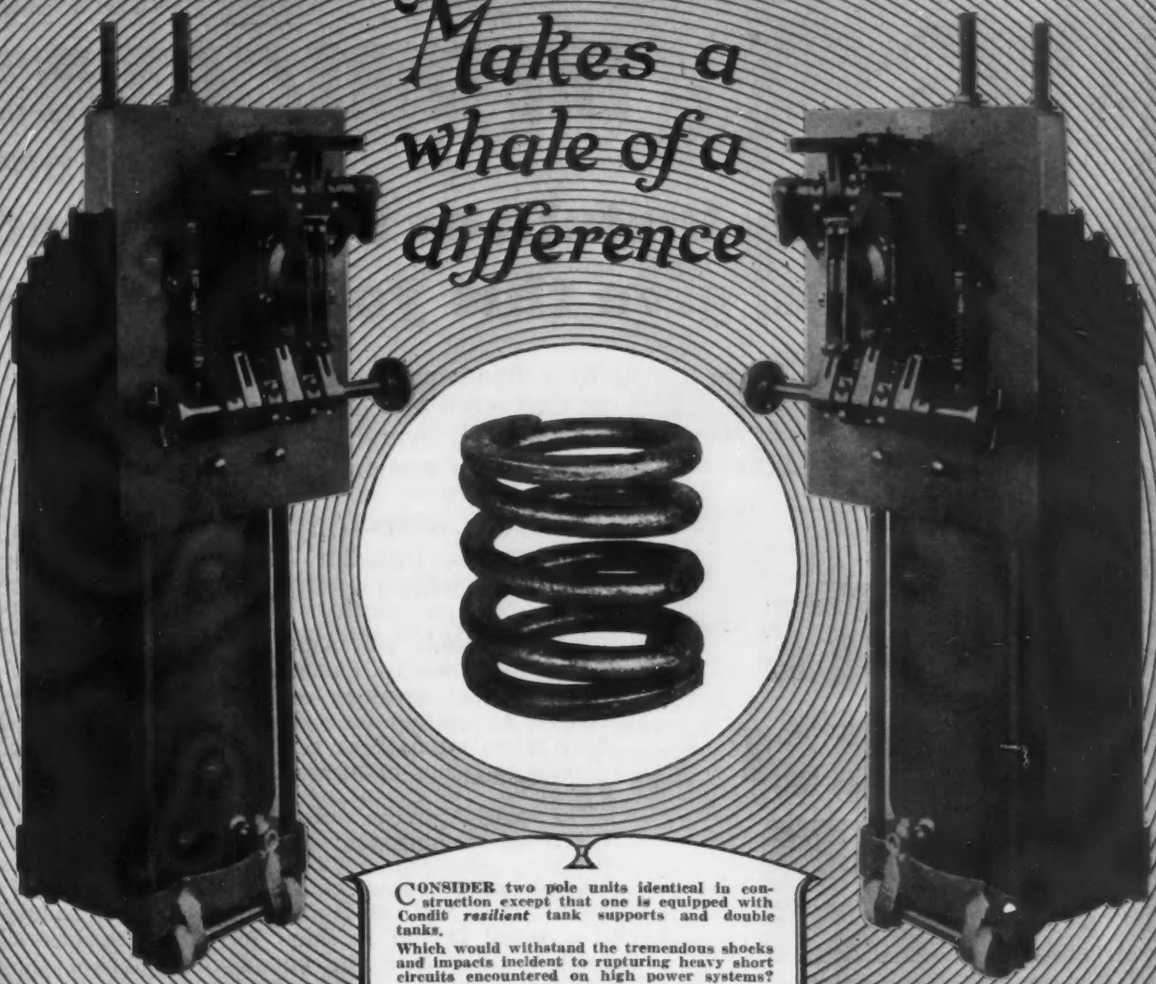

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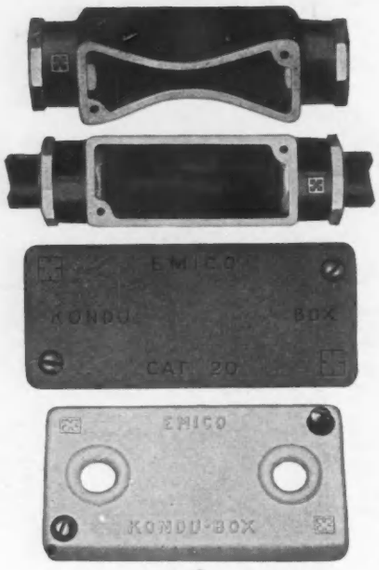
If you use, install, or specify conduit fittings, give this your attention

There are many refinements of design and manufacture in Kondu fittings that would be considered very important were they not so completely overshadowed by the threadless feature and its tremendous economy in installation.

Consider these—(in the aggregate their value to the installer of conduit wiring is well worth while):



Patents pending

Kondu fittings are made of Certified Malleable Iron, which can be hammered completely out of shape without breaking and it is not materially affected by rust or corrosion. That means something when strength is needed or the fittings are exposed to fumes or atmospheric moisture.

The location of the screw hole lugs gives an unobstructed opening that makes splicing easier.

Kondu cover screws cannot fall out. The metal around the screw hole is swedged around the shank of a rolled thread machine screw, which has a shank smaller than the outside diameter of the threads.

In the porcelain cover the screws are retained by a fibre washer forced into a countersunk screw hole in the cover. Besides retaining the screw, the washer gives a cushion under the screw head and prevents breakage of the porcelain from excessive tightening.

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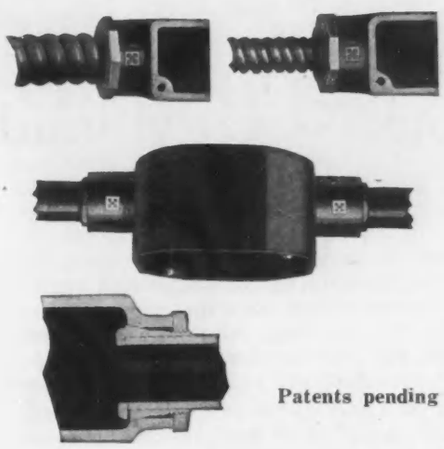
DUIT FITTING

Underwriters Laboratories



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Armored cable may be connected to rigid conduit of the same outside diameter without adaptors or connectors.

Where the diameters differ, Kondu armored cable adaptors give a perfect connection and a continuous ground without unsightly set screws.

Kondu knockout box connectors assure a rigid connection to pressed steel knockout and switch boxes without threading.

The enameled surface of the exposed conduit is preserved. Since there is no threading, the wall of the conduit is not weakened and there are no exposed threads to rust.

Remember, though, that the big saving, the real economy, in Kondu fittings is their threadless feature; the elimination of all tools except a hacksaw, a reamer, and a Kondu wrench; that the fact that the conduit does not have to be screwed into the fitting, making possible bends instead of extra fittings to go around obstructions.

These other points are EXTRA refinements, good measure, that increase the value of Kondu fittings to the installer.

For convenience, use the coupon. Check which you want, the catalog, the sample fitting, or both.

Every user, installer, and specifier of conduit wiring should know the saving and convenience of Kondu fittings. A sample fitting, a detailed description of its merits, and the catalog listing the complete line in all shapes and sizes from ½ in. to 4 in. will be sent upon request.

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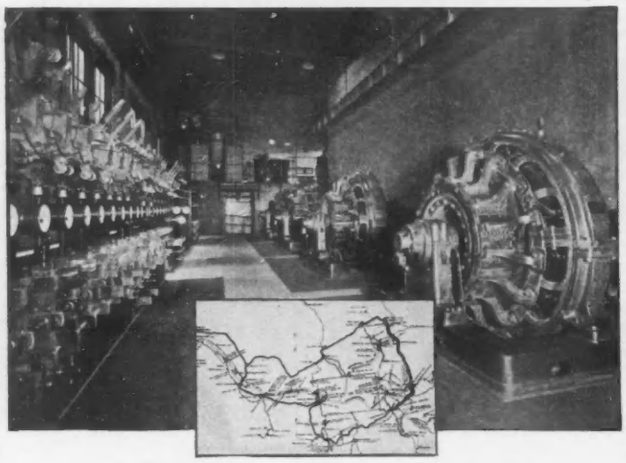

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IN THE Pittsburgh district, the Duquesne Light Company provides lights and power to hundreds of thousands of industrial plants and homes. It serves an area of a thousand square miles, containing 182 busy municipalities. No factor which contributes to the assurance of 100 per cent reliability has been overlooked, for interruption would mean disruption in this most active industrial district.

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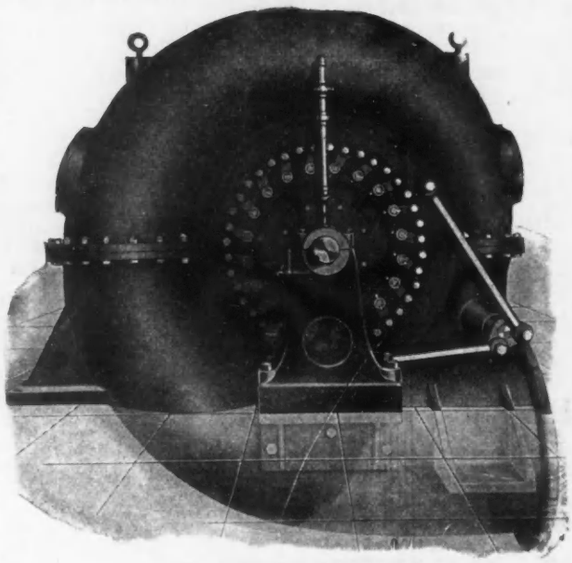

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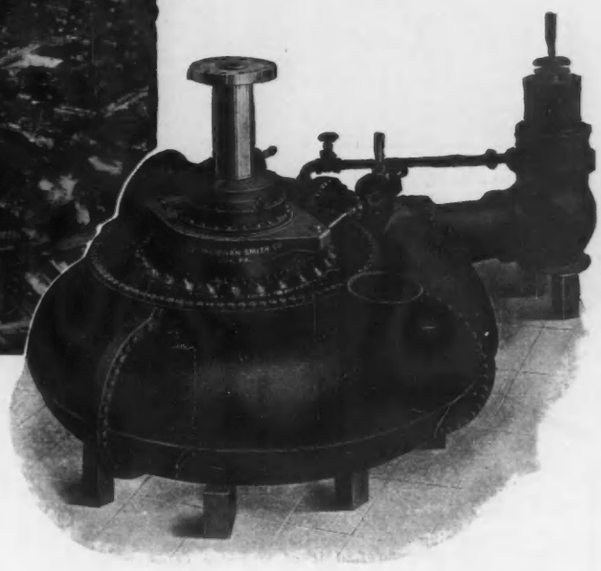

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Hydraulic Turbines for Seattle

The illustration on the right shows one of the 40,000-hp. turbines recently installed for the City of Seattle, Washington—the gateway to Alaska and the Orient.

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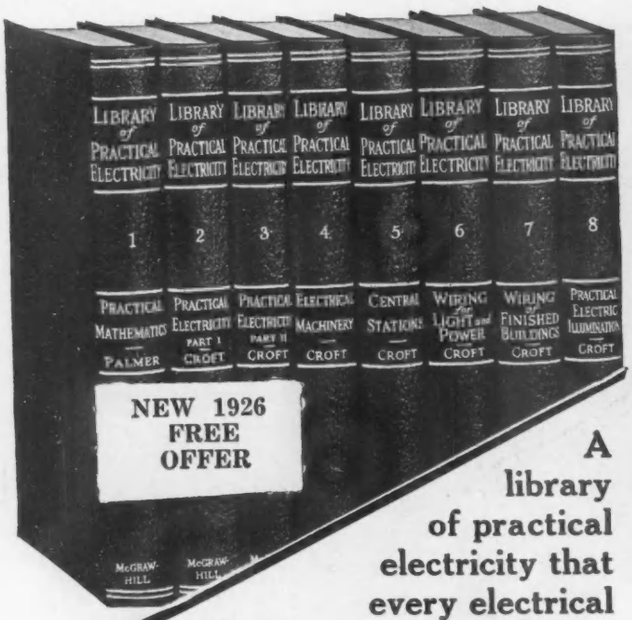
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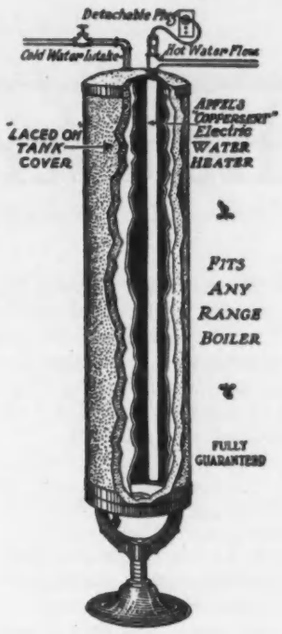

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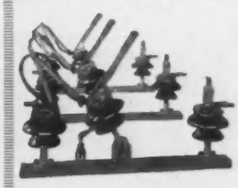

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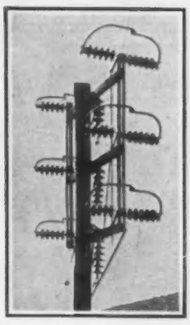

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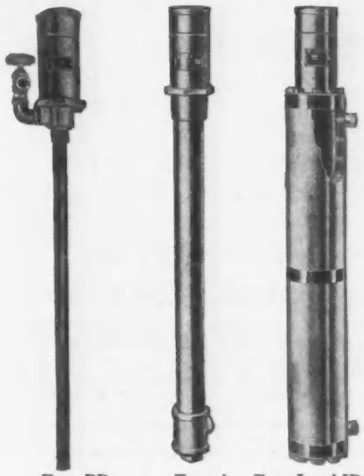

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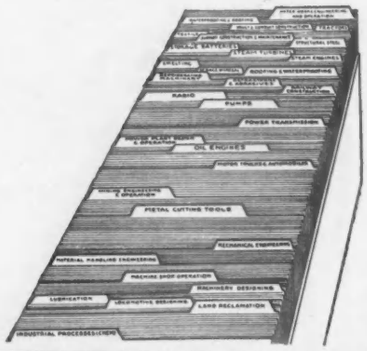

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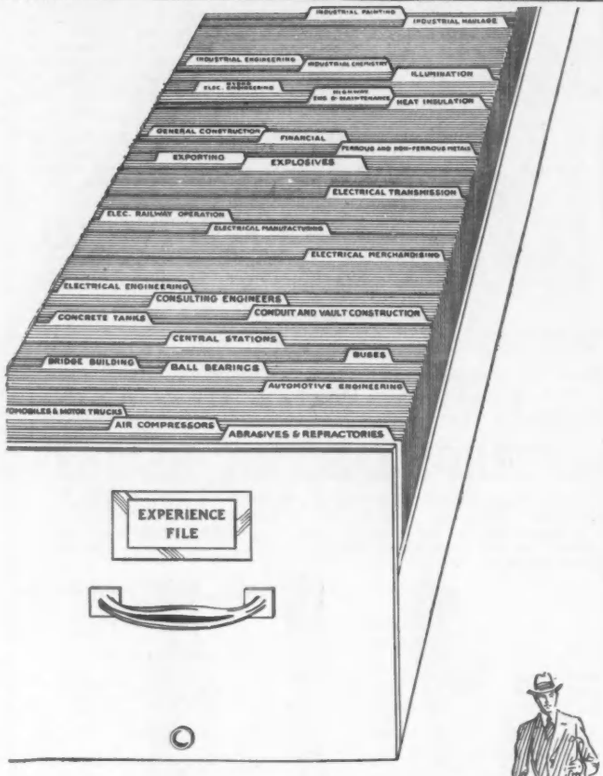

A Few Facts From The Experience Index

Going through the McGraw-Hill experience file at random you will find such facts as these:

5 McGraw-Hill men formerly in automotive engineering.

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16 McGraw-Hill men formerly with central stations.

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And so on.

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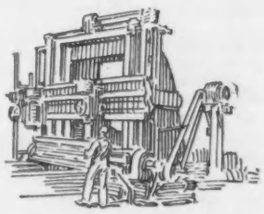
As editors, department heads, service men, marketing counselors and field representatives, these men have become essential units in the McGraw-Hill organization, absorbing its purpose and spirit and devoting their fine attainments to carrying forward its tradition of over a half-century's service to industry.

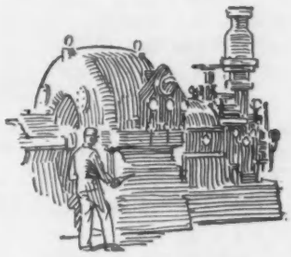
The experience of these men has been cataloged, classified and filed for instant reference. That file is the nerve center of the organization. Thumb over the index tabs and it will be strange if you do not find a man, or twenty men, who have a working knowledge of the industry to which you sell, or the equipment which you make.

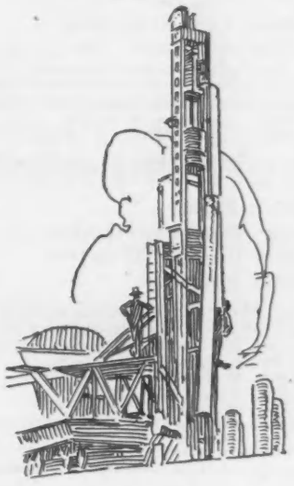
For more than fifty years the McGraw-Hill Company has known industrial America. Its contacts have been inside contacts; its fund of experience is the composite gained in shop, factory and field.

Through this intimate knowledge and constant contact, McGraw-Hill seven years ago sensed the step that industry is now taking in applying to its selling the same science and caution that have advanced industrial production and reduced costs. The service of McGraw-Hill Publications was extended to embrace not only the publishing of technical information on production and engineering but counsel on scientific, waste-free selling. This counsel is epitomized in the following McGraw-Hill Four Principles of Industrial Marketing which today are bringing country-wide endorsement from industry, bank, advertising agency and university.

MARKET DETERMINATION—An analysis of markets or related buying groups to determine the







is here!

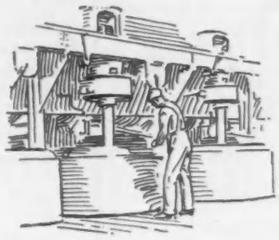
potential of each. With a dependable appraisal of each market, selling effort can be directed according to each market's importance.

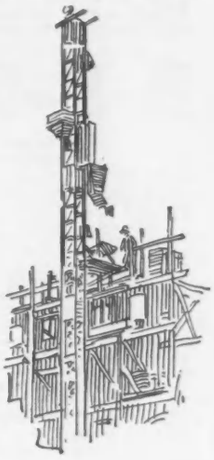
BUYING HABITS—A study of the selected market groups to determine which men in each industry are the controlling buying factors and what policies regulate their buying. Definite knowledge eliminates costly waste in sales effort.

CHANNELS OF APPROACH—The authoritative publications through which industries keep in touch with developments are the logical channels through which to approach the buyer. In a balanced program of sales promotion these publications should be used effectively and their use supplemented by a manufacturer's own literature and exhibits.

APPEALS THAT INFLUENCE—Determining the appeals that will present the product to the prospective buyer in terms of his own self-interest or needs.

These Four Principles are more than a formula. They are a method, repeatedly tested by practical application, backed by a half-century of intimate acquaintance with industry. Any manufacturer selling to industry can apply them to advantage in his own marketing program. Our Marketing Counselors will be glad to lay the details before you or your advertising agent. A conference can be arranged by communicating with our nearest office.





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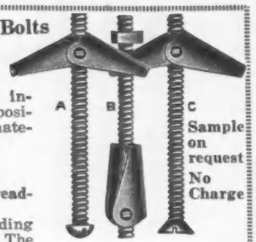
Paine Toggle Bolts



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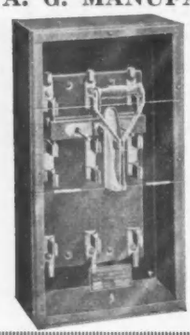

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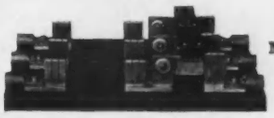

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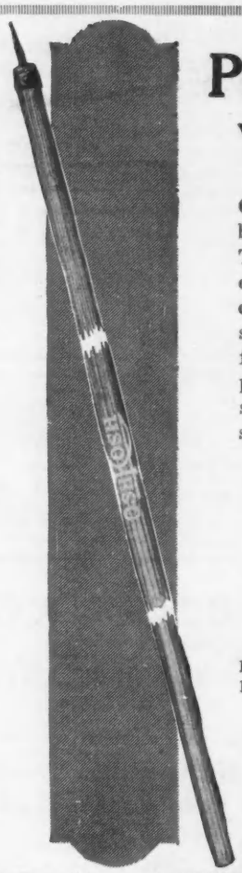

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with greatest strength where needed

Oshkosh Tools are designed to be most practical for the job. The materials used are not only the best procurable, but careful attention was given to selecting the proper materials for each tool. We make a complete line of Pole Line Construction Tools and carry large stocks.

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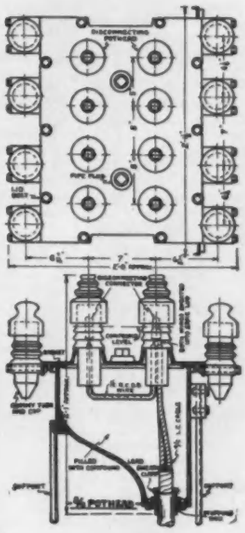
TRANSFORMER VAULT WITH G & W FLEXIBILITY



EIGHT CONDUCTOR POTHEAD

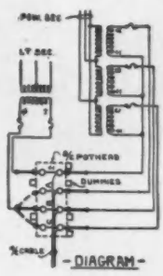
Two different loads independently operated from the same cable—real flexibility. You can do it neatly with G&W disconnecting potheads.

A four conductor cable uses an eight tube G&W pothead. Parallel each pair of tubes inside the pothead as shown in the sketch. Then each load can be connected independently of the other and with only one pothead — a G&W pothead — on the end of the cable.

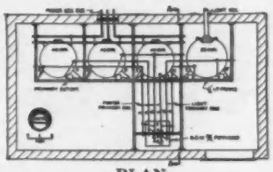
You have a clean-cut job. You have simplicity. You need have no lead wipes and no special bus arrangement. You can disconnect at the pothead in case of trouble on one load while the other still functions. This is flexibility.

In the same way you can use a six tube pothead on a three conductor cable and a four tube pothead for a two conductor. G & W potheads and boxes are great solvers of distribution problems. Let us help you. Get our catalog.

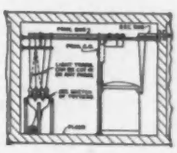
Simplicity, flexibility and safety are incorporated in your system when you use G & W specialties.



-DIAGRAM-



PLAN



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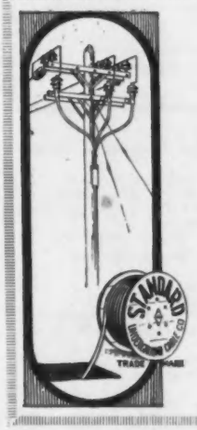

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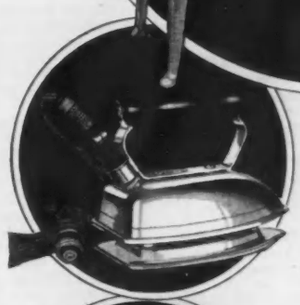

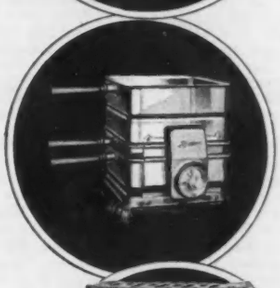

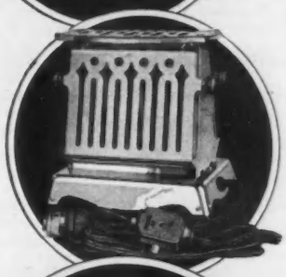

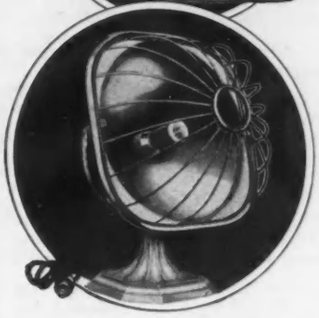

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Laundryette Mfg. Co.
Pacific States Electric Co.
Woodrow Mfg. Co.

Water Heaters
Electric Heating & Mfg. Co.
Everhot Elec. & Mfg. Co.
Hicks, W. Wesley
Pacific States Electric Co.
Westinghouse El. & Mfg. Co.

Welding Apparatus, Electric
General Electric Company
Graybar Elec. Co., Inc.
Ohio Brass Company, The
Pacific States Electric Co.
Westinghouse El. & Mfg. Co.

Windings
Dudlo Manufacturing Co.

Wire, Aluminum
Aluminum Co. of America

Wire, Asbestos Covered
Rockbestos Products Corp.

Wire, Bare and Insulated Copper
American Brass Co., The
Anaconda Copper Mining Co.
California Wire & Cable Co.
Collyer Insulated Wire Co.
Dudlo Manufacturing Co.
Graybar Electric Co., Inc.
Indiana Rubber & Insulated Wire Co.
Indiana Steel & Wire Co.
Maydwell & Hartzell, Inc.
New York Insulated Wire Co.
Okonite Company, The
Okonite Callender Cable Co.
Pacific States Electric Co.
Peerless Ins. Wire & Cable Co.
Phillips Wire Co.
Roebling's Sons Co.
Rome Wire Co.
Simplex Wire & Cable Co.
Standard Underground Cable Co.

Wire, Electric Resistance
Driver-Harris Company

Wire, Galvanized Steel
American Copper Products Corp.
Graybar Electric Co., Inc.
Maydwell & Hartzell, Inc.
Pacific States Electric Co.
Phillips Wire Co.
Rome Wire Co.
Simplex Wire & Cable Co.
Standard Underground Cable Co.

Wire Reels, Pay-Out and Take-Up
Matthews Corp, W. N.

Wiring Devices
Circle F Mfg. Co.
Hart & Hegeman
Harvey Hubbell, Inc.
Pacific States Electric Co.

Wiring Specialties
Koch, Paul W. Co.
Pacific States Electric Co.

X-Ray Reflectors

An Apology to Saint Paul

¶ In our advertisement of X-Ray Floodlighting Projectors which appeared in this magazine last month, a misstatement of fact occurred which credited another city with the illuminated Montgomery Ward & Company Building, which is located in Saint Paul, Minnesota.

¶ This was due entirely to carelessness and "slipped through" unnoticed until too late for timely correction. We hope our many friends in Saint Paul have overlooked our mistake and pardoned our unintentional error.

¶ The Montgomery Ward & Company Building in Saint Paul is without doubt one of the best examples of modern architecture and construction, and would be a great credit to any community. With the aid of one hundred and sixty-two X-Ray Floodlighting Projectors this building is visible each night for miles around, and is a never-to-be-forgotten sight.

¶ Mr. R. D. Myers, Illuminating Engineer of the Northern States Power Company, Saint Paul, who designed and executed this remarkable lighting installation, is indeed to be congratulated on the result of his efforts.

CURTIS LIGHTING, Inc.
1119 West Jackson Boulevard
CHICAGO
31 West Forty-Sixth Street, New York
3113 West Sixth Street, Los Angeles

AFTER THE SUN GOES DOWN X-Ray Reflectors

THE PHILADELPHIA STAFF

OF THE

McGRAW-HILL PUBLISHING COMPANY

INCORPORATED

announces the opening

of its new

and larger quarters

INSURANCE COMPANY OF NORTH AMERICA BUILDING

SIXTEENTH STREET AND PARKWAY

PHILADELPHIA

L. D. WALDRON
General Manager, Eastern District

W. K. BEARD
N. O. WYNKOOP
R. F. BEARD
M. A. WILLIAMSON
W. R. VAN KLEEK
J. F. CLEARY
D. N. PIERCE

The new telephone numbers are

RITTENHOUSE 3109, 3110 AND 3111

75 Years Ago

WHEN the great area known as California first became a State it was in a large measure a wilderness. Today it proudly takes its place among the leaders of the agricultural world.

Those men and women who endured the hardships of the "fifties" to till our soils have builded a history behind California agriculture of which the entire State may be justly proud; and it is of particular gratification to the power companies that they have been able to play a part in the development of the agricultural industry to a point where the comforts and conveniences, so well merited by the years of toil passed through, may now be enjoyed upon the farms of this State.

CALIFORNA ELECTRICAL BUREAU

EDUCATIONAL — PROMOTIONAL

Offices at

San Francisco
447 Sutter Street

Fresno
407 Power Building

Los Angeles
610 Cotton Exch. Bldg.

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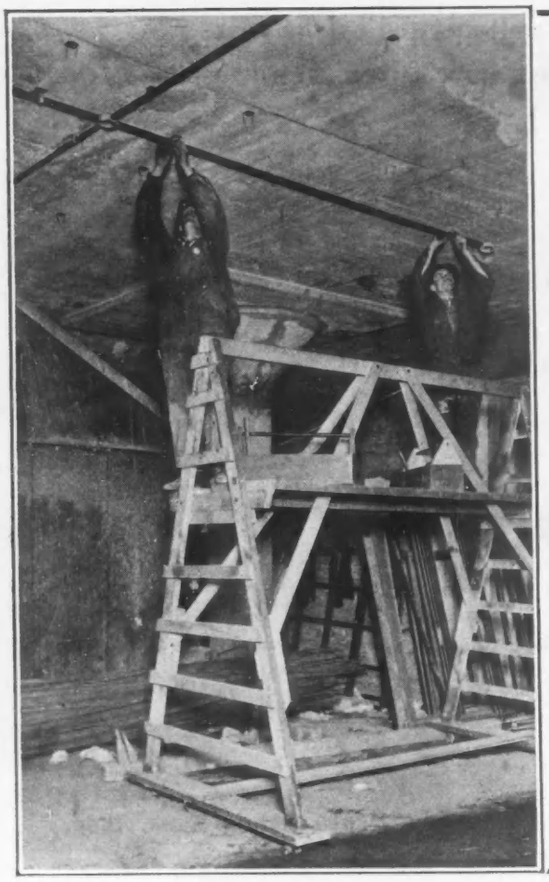


ELECTRODUCT

Easy to Put Up

The trade likes "Electroduct" because it is smooth and easy to handle—smooth, because it's thoroughly cleaned and made from National Tube Co. scale-free pipe. And being smooth before being enameled—it's glasslike afterwards. The acid and alkali resisting enamel is furnace baked and stays "put."

"Electroduct" cuts, threads, bends and fishes easily—and has clean perfect threads. Try it yourself. Sample mailed on request.

AMERICAN CIRCULAR LOOM CO. TRADE MARK

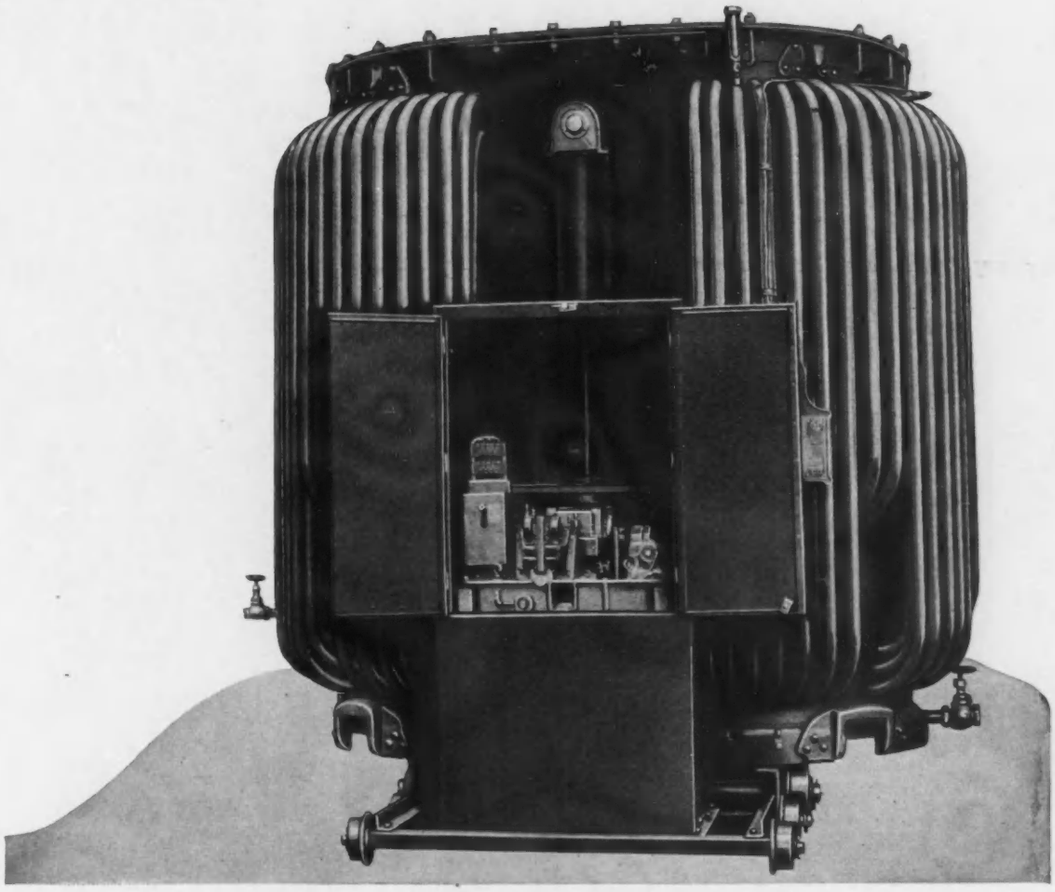
American Circular Loom Company

90 West Street New York City

Represented by

Clapp & LaMoree, Los Angeles and San Francisco

C. R. Dederick, Portland



Load Ratio Control—for Belgium

In the electrolytic refining of copper it is very desirable to control the current by varying the voltage—and without interruption of the circuit.

To accomplish this, the Oolen Refinery of the Societe Generale Metallurgique de Hoboken in Belgium chose to vary the voltage applied to the rotary converter by means of a G-E Transformer equipped with Motor-Operated Load Ratio Control. By this method the voltage can be varied at any time while the equipment is in operation.

These G-E Transformers are rated 2055 kv-a., taking power from a 3-phase, 6600-volt, 50-cycle circuit and delivering 5270 amperes to the 6-phase rotary converter at a voltage which can be varied from 66 to 130 volts in nine steps. Finer adjustments in the d-c. voltage are obtained by field control.

This installation emphasizes the enterprise of the American electrical manufacturer in the European field. It is another instance of the cosmopolitan demand for the product of American engineering in things electrical.

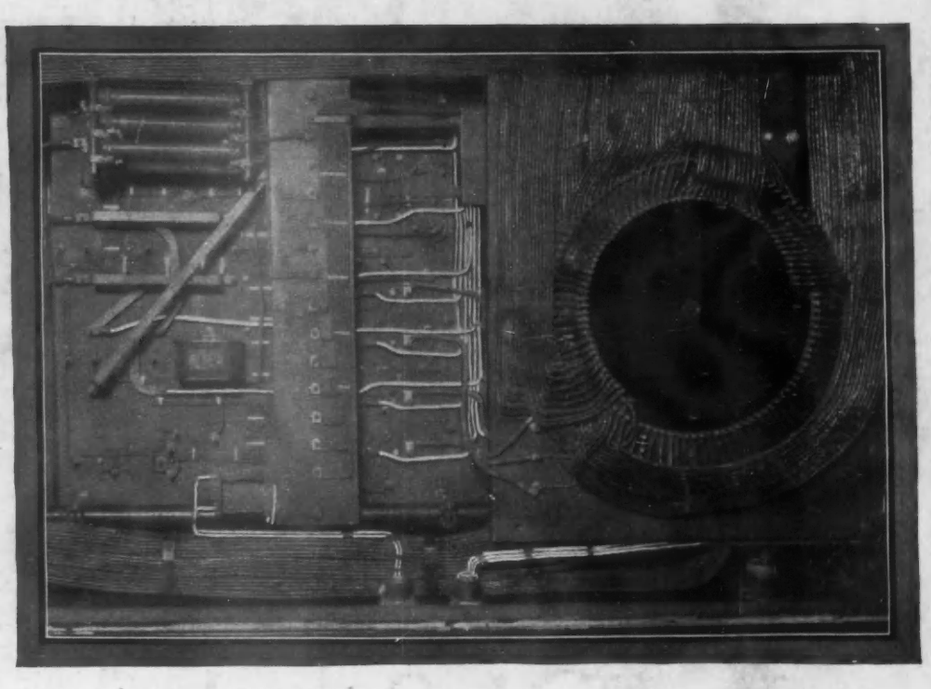
17D-8

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN ALL PRINCIPAL CITIES

ROCKBESTOS

– *the asbestos covered wire*



Switchboard in the Super-Power Station of the OHIO RIVER EDISON CO., Toronto, Ohio.

Designed and Constructed by Stevens & Wood, Inc., New York City.

Wherever heat is a factor use Rockbestos wire

In this intricate mass of wire, a short or severe overload might cause damage and a shut-down, with consequent loss of time in operation of important machinery, would be serious.

It was necessary therefore to select wire that would be unquestioned in the performance of its duty, and with the right kind of insulation to withstand unusual conditions.

That is why ROCKBESTOS wire was selected by the engineers of STEVENS & WOOD, INC., for the important leads on this switchboard.

Wherever heat is a factor ROCKBESTOS should be used. It will stand up under any severe condition to which it may be subjected.

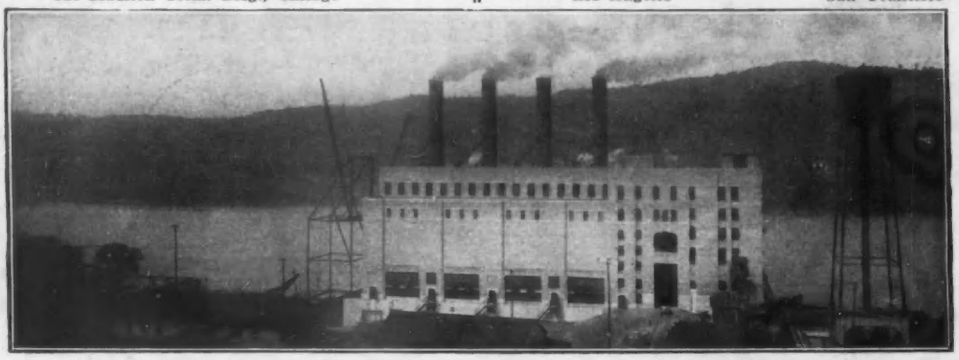
ROCKBESTOS PRODUCTS CORPORATION

NEW HAVEN, CONN.

5942 Grand Central Term. Bldg., New York
224 Madison Term. Bldg., Chicago

Pacific Coast Distributors:

BAKER-JOSLYN COMPANY

Distributors of Electrical Equipment and Construction Materials

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Second and Bryant Sts., San Francisco